FLIGHT, JULY 14, 1938

FIRST AERO WEEKLY IN THE WORLD

REGD. AT THE G.P.O. AS A NEWSPAPER

...al Engin. Library

JUL 22 1938

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

...o. 1542
...ol. XXXIV

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

SIXPENCE
EVERY THURSDAY

Among aerodynamic improvements, the retractable undercarriage accounts for a large share of the progress in performance.

Lockheed hydraulic actuation has been developed to an extremely high pitch of perfection, and has been extensively adopted by the leading manufacturers for actuating retractable undercarriages and for a variety of other controls.

AUTOMOTIVE PRODUCTS COMPANY, LTD., LEAMINGTON SPA.

LOCKHEED

HYDRAULIC ACTUATION

"Bristol" BLENHEIM BOMBER

THE BRISTOL AEROPLANE CO. LTD., FILTON, BRISTOL

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditus, Sedist, London. Telephone: Waterloo 3333 (50 lines).

8-10, CORPORATION ST., COVENTRY. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.

GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2. Telegrams: Autopress, Birmingham. Telephone: Midland 2971.

260, DEANSGATE, MANCHESTER, 3. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.

26B, RENFIELD ST., GLASGOW, C.2. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 13 0. 6 months, 16s. 6d. 3 months, 8s. 6d. Other Countries: Year, £1 16 6. 6 months, 18s. 0d. 3 months, 9s. 0d.

No. 1542. Vol. XXXIII. JULY 14, 1938. Thursdays, Price 6d.

The Outlook

Maladroit, but—

SYDNEY has been reached by the first flying-boat-all-through air service on the England-Australia route, the journey taking a little more than ten days. Thus comes to fruition the second great step of the Empire Air Mail scheme which has been in preparation for years. One may perhaps reflect, and regret, that two who had much to do with planning the scheme through its early stages now have to watch its fulfilment from outside, so to speak. Sir Christopher Bullock and Mr. Woods Humphery did sterling work in getting the Empire Air Mail scheme through, and it is fitting that the fact should be remembered on the occasion of the first scheduled flight.

That the flight took one day more than intended, ten days and a few hours instead of nine and a half, is in itself of comparatively small moment. So also is the unreadiness of the Darwin base to receive the first machine, although the fact that the reception was in marked contrast with that given to the first Dutch air mail machine at Darwin has given rise to severe criticism from all sections of the Australian Press. Mr. Thorby, Australian Minister of Defence, has apparently tried to shift the responsibility by pointing out that Great Britain was partly to blame because the British authorities had "watered down" the original Australian scheme which called for a breakwater to shelter the flying boats. Passengers on the next machine to arrive were cleared in nine minutes after mooring, so it seems that no breakwater is necessary for the time being. In any case, the unreadiness of Darwin cannot be much worse than the makeshift at Southampton.

What is a good deal more important than these relatively trivial delays is the fact that when *Challenger* arrived at Darwin, she only had another twenty minutes or so of daylight, and it is gathered that Darwin still does not possess the flare paths and other equipment which is necessary to ensure safe alighting after dark. As the machine was on a scheduled flight, it is to be assumed that delays due to headwinds and other causes had been foreseen and taken into account. It is to be hoped that a wider margin will be allowed when the new service gets into its stride. We do not want a repetition of the Alexandria mishap.

A Foretaste

THE Long-range Flight has done a fine piece of work, and the Vickers Wellesley, with its Bristol engine, has given us a taste of its quality. Formation flying is always more exacting than are flights by single machines. The four Wellesleys which have flown from Cranwell to the Persian Gulf and back to Egypt have put up far the finest performance of the kind to date. Four thousand odd miles in formation is quite an outstanding feat, and this country and the whole Empire will be proud of the men, the machines, and the engines which have accomplished it.

Fine as is this flight, it is only a preliminary run. Mr. B. N. Wallis, when he introduced the Wellesley to the public, mentioned eight thousand miles as possibly being within the powers of this machine. That is the figure which we all have in our minds, and that is the distance that we hope to see a formation of the Long-range Flight cover in due course. The Flight is gaining experience, and its members have proved that they can do great things. No one will wish to hurry them. In their own good time they will go on, we hope, to still greater feats. The monsoon is still blowing over India, and until it ends, some time in September, we must not expect any serious attempt at pushing through to Australia in a flight which will shatter all world records and raise the reputation of British airmanship to the very top of that particular tree. In the meantime we may pat our national back over this very fine foretaste of better things to come.

Training for What?

DURING the past few months there has been a good deal of discussion among knowledgeable people and (more particularly and dangerously) among the lay public about the suitability or otherwise of the Miles Magister as a primary training type. On page 39 our contributor "Indicator" states his opinions on this matter.

Whether or not he is capable of judging the machine from the point of view of the complete novice is not for us to say. The fact remains that, whatever little idiosyncrasies the Magister may display, these and their correc-

tions must obviously be part of the training curriculum for this type.

What is, however, entirely overlooked by the majority of people who have expressed their opinions is that the Reserve and other Service pupils are being taught not so much merely to fly as to fly the kind of aeroplane which is now going into service. For the civil pilot it is only fair to use a type of machine which is as simple and viceless as any can be; the machines he intends to fly later on are, too, designed solely to ensure safe and easy transport. The Service pupil, however, is being trained not for his own amusement but to prepare him for more and more heavily loaded types which may in no case be viceless, and as the wing-loadings go up the need for thorough preparation becomes more and more important.

It is all very well and natural to be sentimental about pupils and, everything else being equal, it would certainly be kinder to train them on very easy aeroplanes. But even if each one of them carried out, say, fifty hours on some absolutely conventional, lightly loaded trainer with the easiest possible characteristics, he would still need to learn how to fly the modern type of semi-military aeroplane, and the probability is that it would be more difficult and dangerous to evolve an intermediate conversion course than it would be to train him from the word "go" on a machine designed to the new formula.

There might be some point in placing a minimum limit on the dual instruction provided—though such a course would tend to discourage the really proficient pupils—and there would be a great deal of point in insisting that certain types of advanced dual should be given more thoroughly. As it is, this advanced dual, given every few hours, is part and parcel of the curriculum of at least the best of the schools.

If we are to be really hard-hearted and matter-of-fact we might say with some justification that it is better that trainers rather than Service types should be wrecked. At least the chances of fatal injury are less certain. As we have said before, pupils are not being trained at the country's expense for their own amusement or delectation—they are being trained for possible emergency.

Dominion Pilots

POLITICALLY Canada and Australia are in very different case. Canada has no urgent defence problems, while in Australia such problems are very much alive. This is stressed by the attitudes of the two Dominions towards the supply of pilots for the Royal Air Force.

Hitherto all Dominions have encouraged their young men to come to Great Britain and serve in the R.A.F., but now Australia has announced that, owing to the need of expanding the R.A.A.F., she can send no more for at least two or three years. This decision does not in any way weaken the total air strength of the Empire; it merely means a somewhat greater concentration of that strength in the Pacific, where the R.A.A.F. forms, as it were, a reinforcement of the Singapore garrison. Singapore and the R.A.A.F. would certainly work in close collaboration in the event of trouble.

Canada, on the other hand, is one of the most tranquil parts of the world so far as external dangers are concerned. She is therefore prepared to train numbers of young Canadians, apparently at her own expense, and send them across the Atlantic to swell the ranks of the R.A.F. We alluded last week to the discussion between the Canadian Government and the Opposition on this point. It has now been made quite clear that the only difference between the two concerns the method of help, not the principle of helping. The method which Canada has chosen will relieve the Air Ministry of effort, and presumably of some expense. It is recognised that the training must be such as to satisfy R.A.F. standards. For this generous offer the whole Empire will be grateful to His Majesty's Government in Canada.

St. Simeon Stylites

IN one of Rudyard Kipling's stories about the South African War an American character is made to remark that the British are far more afraid of being bored than of being killed. Mr. J. S. Sproule and Flt. Lt. W. B. Murray have done something to repudiate that reputation. To sit for twenty-two hours in a cramped sailplane on top of a rising current of air is a feat of endurance which must arouse admiring astonishment. Merely to have watched the slowly wheeling Falcon III for the duration of its record flight would have been more than most men, British or otherwise, would have cared to undertake.

Admittedly, the man who held the joystick had to keep his wits alert throughout his spell of duty, and there were moments of anxiety when the wind showed signs of dropping, which would have meant that all the previous endurance would have gone for naught. Judgment had to be exercised in smelling-out such rising currents as persisted, and this must have served to banish boredom for a time. But the sight of that line of Chiltern hills, with the bowl at one end of it, must have grown inexpressibly wearisome after hours of circling above it. The fall of night and the lighting of the hurricane lanterns along the ridge must have been exciting events.

The world's aeronautical knowledge has not been increased by this feat, but, at least, attention has been drawn to the gliding movement in Britain, and one world's record has been captured for this country. Congratulations are due to the much-enduring pilots.

Rules for Bombardment

MR. J. M. SPAIGHT'S interesting article on "Bombing and International Law," which appears on page 38d of this issue shows the need for some new international legislation. It is not the case that once fighting has started all laws of war cease to be effective. Some rules we must have, and even in the Great War some rules were observed by all the belligerents. At the peace conference there was much talk of punishing war criminals, and though that talk came to naught, it may well happen that in the future some other victors may insist on exacting penalties from those who have broken the recognised rules. It is in the interests of the combatants as well as of the civil populations that definite rules should be drawn up to deal with the air arm.

Mr. Spaight points out that naval and military bombardments of cities have been recognised as legitimate warlike practice in the past. In his book *Air Power and the Cities* he goes very fully into the subject, and examines many instances, particularly of naval bombardments of coast towns. He points out, however, that in many, if not most, cases the naval commander tried to inflict as little harm as possible on the civil population while shelling the military objectives.

In the conflicts in Spain and China there seems ample evidence that many bomber pilots have not put any such restraint upon themselves. It is more than time that international law should stigmatise such promiscuous bombing as criminal. The more fanatical upholders of air power should be the less inclined to oppose such restrictions in view of the now clearly proved fact that such brutality fails to achieve the alleged object of breaking down the cities' will to resist.

Gosport

SEPTEMBER, 1917, was the date when Gosport was "put on the map." Last Saturday may well be said to have been the date on which the name Gosport was underlined there. The affair at Brooklands, reported in this issue, was something more than a reunion of some of those who served as instructors at Gosport when the School of Special Flying was started there in 1917. It gave an opportunity to the outside world to find out something about how and why Gosport started and to discover to

DIARY OF FORTHCOMING EVENTS—PAGE 43

COMBINED OPERATIONS: A Fairey Swordfish torpedo spotter reconnaissance biplane observes a singularly nonchalant landing party during the recent combined operations on the South Coast. Manœuvres on a much larger scale are scheduled for the latter part of this month along the eastern seaboard.

what an amazing extent present-day Central Flying School practice follows the fundamental principles laid down in 1917 by Col. Smith-Barry.

In Service circles at home and abroad there is a vague sort of awareness that some time during the war, 1914-18, a special flying school was established at Gosport, at which certain rather unusual methods were adopted, leading to what became known as the "Gosport system." At Saturday's reunion there came to light many interesting and amusing details which help to explain how much modern flying instruction owes to Col. Smith-Barry and those associated with him in the Gosport venture. For venture it was. The methods were unlike any which had previously been followed, but the pilots who were being sent to France had not the skill in handling aeroplanes which was essential, notably in getting out of spins and other unusual situations, and something had to be done about it. It is to the everlasting credit of Major-General Salmond, now Marshal of the Royal Air Force Sir John Salmond, that he appreciated the merits of the Smith-Barry system and was willing to take a chance on it—a chance which, had his judgment proved wrong, might have caused him a great deal of embarrassment. That he was not wrong was proved when the first batch of pupils passed their flying tests in twelve days! The tests included not merely "straight" flying, but loops, spins, rolls and such other evolutions as were necessary if a pilot were to survive the "dog fights" of those days. The Gosport system is the basis of all flying instruction all over the world to-day, so let us do honour to it and to its creator, Col. R. R. Smith-Barry.

Brighter Aviation

LAST year the Annual Report on Civil Aviation, which covered 1936, was published on December 20, and *Flight* took the Department to task for its dilatoriness, pointing out that at this rate the Report for 1937 would be published in the spring of 1939. We were wrong. The Report was published last Monday, and *Flight* is pleased to be proved wrong for once.

To receive even the first half of the Annual Report on the Progress of Civil Aviation on July 11 was something of a shock. But to find it clothed in an attractive blue cover, with the *Caledonia* flying boat hastening across from Newfoundland to Ireland, instead of the drab cream paper cover in which the Report has always been dressed, made one wonder whether the Department had misread certain sections or passages of the Cadman Report.

The explanation is found in the Foreword, which states that this year and in future years the Report is being divided into two separate publications, and that "the present volume contains information of general interest with regard to civil aviation in 1937, supplemented to some extent with brief indications of the problems which have presented themselves and of the policy which is being followed. *The scope and style of this volume is intended to have a somewhat wider appeal for the general reader* than has been possible under the limitations of the previous form of the Report." The italics are ours.

One suspects that the prompt publication of this first volume is a deep-laid scheme to afford unlimited leisure for the production of the second and more "serious" volume. But no; statistical information will be published separately, the Foreword states, in the "Civil Aviation Statistical and Technical Review," *which will be issued shortly*, and which "will supply the additional data which are required by experts and the serious student of civil aviation." Good. Very good!

NO LONGER FREE FOR ALL

Explaining Some of the Points and Pitfalls in the Internal Air Service Licensing System : The Need for Care

By E. GILBERT WOODWARD

FOR a number of years now operators of omnibus services and motor vehicles for the carriage of goods have been subjected to a strict control of their activities by the issue of licences. Many of them have found to their cost that the wholly erroneous impression that the necessary licence was, like the Road Fund Licence, obtainable over the counter have damaged their business by a failure to satisfy the Licensing Authority of their need. All too late they found that the preparation of their information was inadequate, and that, in consequence, they had failed to obtain authorisation for some portion of their activities through lack of proof.

Parliament has decided that it is now the turn of the operators of aircraft, and unless they take warning now they may find themselves in difficulties when it is too late.

Two years ago the Air Navigation Act, 1936, provided that an Order in Council might be issued laying down the necessity for licences and the procedure to be followed in obtaining them. It is not generally known that recently a draft Order in Council has been issued and that shortly the Order in its final form will be passed. It is not anticipated that the draft Order will in substance be altered, though some of the matters of detail may be changed before the final form is approved. The draft Order does not contain provisions relating to all the matters mentioned by the Act of 1936, and for this operators should be duly grateful.

"Separate" Fares

Shortly, the Order provides that licences are necessary in respect of certain journeys within the United Kingdom, the Channel Islands, and the Isle of Man. These journeys are described as "all journeys performed by aircraft on which passengers are carried for hire or reward at separate fares." There is added to this an exception that no licences are required for journeys which begin and end at the same place and in the course of which no passenger is landed or embarked at any other place. Secondly, a licence is needed for all journeys performed by aircraft on which goods are carried for hire or reward, other than a journey on which a single consigner has the exclusive right to have his goods carried. This portion of the Order is followed by some difficult paragraphs defining when passengers shall be deemed to be carried at separate fares. The words used are the same as those used in the Road Traffic Act, 1930, which provided for the licensing of omnibuses. It is enough to say that when these words were used in that Act it took a number of cases in the High Court before their real meaning was discovered. Since the same words are used in the Order, the pronouncements of the High Court already given will be of some help, but the meaning of "carriage at separate fares" will undoubtedly continue to cause a great deal of trouble.

The body which issues the licences is known as the Air Transport Licensing Authority, and consists of three members, one of whom is a person of legal experience.

Operators whose services require a licence will have to apply upon the appropriate form. The application will then be published in order to give an opportunity to certain persons to object to the grant of the licence if they so wish. The persons permitted to object are certain local Councils, including County Councils, persons providing transport by air for passengers or goods, owners of any aerodrome, and public departments. The right of objection which is given makes it necessary that the views of the applicant and the objector should be considered, and therefore provision is made for holding a public inquiry.

It is clear that many of the applicants for licences under the other Acts have fallen into an error in considering a public hearing to be a mere formality. In fact, a public inquiry is conducted in a manner very similar to a Law Court, and not infrequently the parties are legally represented. The witnesses are called to prove the facts, and, in consequence, may be cross-examined by the opposing party. From this very short description it will be seen that to arrive at the inquiry not fully prepared may have serious consequences, and may even result in a failure to obtain a licence at all.

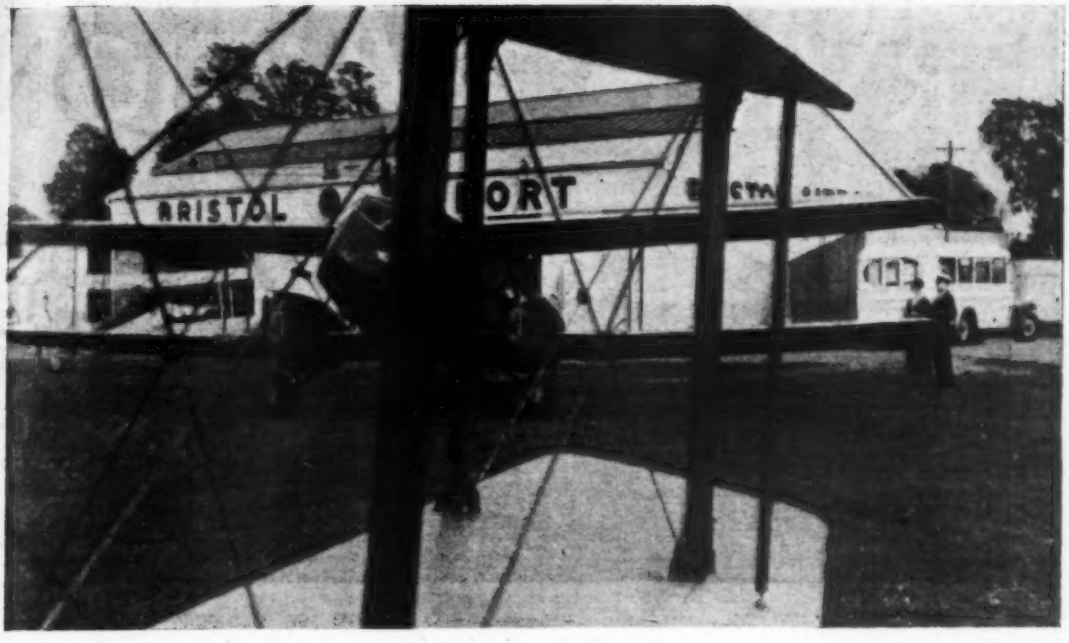
In exercising their discretion to grant or refuse a licence the Licensing Authority must have regard to certain matters which are set out in the Order. This portion of the Order should be carefully studied because an applicant's evidence should be mainly directed to dealing with these matters. When the licence is granted the Licensing Authority may attach conditions to it in order to ensure that the licensee only operates his service in the manner in which the Licensing Authority thinks proper.

In coming to their decision the Licensing Authority must have regard to the co-ordination and development of air services with the object of ensuring the most efficient services to the public and avoiding uneconomical overlapping. The interests of the public generally must be considered as well as of those who require air transport and those who provide it. In particular, due weight must be given to the existence of other air services in the area which it is proposed that the licensee should serve; the possibilities of air transport in that area—an expression which, it is suggested, will be very difficult to interpret; the degree of efficiency and regularity of the air services already provided, and the period for which those services have been operated; and the extent to which it is probable that the applicant will be able to provide a satisfactory service in respect of continuity, regularity of operation, frequency, punctuality, reasonableness of charges, and general efficiency. Finally, the financial resources of the applicant may be examined, though this is not information which an objector can demand to see.

Various Licences

This description is not exhaustive, but it gives a general idea of the matters which will be enquired into before a licence is granted. It is possible for the Licensing Authority in certain circumstances to grant short-period licences for periods not exceeding seven days, in which case none of the formalities need to be complied with. The ordinary licence will remain in force for any period not exceeding seven years, and may then be renewed. In the same way, pending the determination of an application for a licence, a provisional licence may be granted. There is a provision safeguarding the position of the person who is already operating a service at the time when he is required to apply for his first licence.

The conditions which may be put upon a licence may deal with the places between which passengers or goods are to be carried; the places at which intermediate landings may or must be made; the observance of time-tables; the suitability and capacity of the aircraft to be used; and the maximum fares to be charged to passengers, though be it noted that there is no provision for regulating the rates for the carriage of goods. These conditions may be imposed at the discretion of the Licensing Authority, but there are certain conditions which must be upon every licence. These compulsory conditions are to ensure that the requirements of the existing law shall be complied with, and, in general, that pressure shall not be brought to bear upon any person to induce him to refuse booking facilities. The licence will also regulate the wages to be paid by the licensee to his employees.



Where the licence granted differs from the licence which the applicant wanted, or where a licence is not granted, the applicant can require the Licensing Authority to give his reasons in writing. This is a familiar provision in Orders of this type, and is usually followed by some provision providing for an appeal by the aggrieved person. The Order, however, contains nothing of this nature, and the dissatisfied applicant has to be satisfied with studying the views of the Licensing Authority in writing without being able to do anything about it.

Licences may be revoked or suspended if any condition has been broken. Before this is done, however, the licensees are given an opportunity of knowing what is alleged against them and of being able to put in their defence. Where a licence is revoked or suspended, the unfortunate holder of the licence may again, if he wishes, enjoy the reasons for the decision in writing.

There are a number of other matters dealt with in the Order which will require careful study, including the fees to be paid and certain monthly returns which have to be made to the Licensing Authority.

Innocent-looking

Towards the end of the draft Order come two paragraphs which, upon the face of them, are innocent, but which actually may cause great difficulty. These state that a licence shall not be capable of being transferred or assigned, except in certain cases, and that nothing in the Order shall be treated as conferring upon the holder or any other person any right to the continuance of any benefits arising from the provisions of the Order, or any licence granted under it. This means that although an operator may have held a series of licences for many years, he has to prove afresh his right to a new licence when his existing one expires, and, in consequence, there is no safety for the operator, who may be met at the expiry of his licence with fresh opposition from one of the specified objectors.

The Order itself is, of course, at present only a draft. It may, and possibly will, be altered in material particulars before it is finally issued, and, in addition, the Secretary of State is permitted to make regulations for carrying out the purposes of the Order.

In the limits of a short article such as this it is not possible to set out all the terms of the Order, or to give a warning of all the difficulties which will be encountered in endeavouring to comply with it. No operator can safely make application for his licence without studying the Order very carefully and without preparing his evidence in great detail. The operators of goods vehicles have, in many instances, found, to their cost, that to take the licensing provisions applying to them—which are so similar to those in this Order—as being a mere formality, was to be sadly disillusioned.

It will undoubtedly be very difficult to regain any ground lost upon the first application, or to obtain authorisation for anything omitted from the first application, or for which the proof tendered was insufficient.

There is another curious aspect of the Order, in that it apparently makes no provisions for a licensee to apply for the variation of the terms of his licence. Nor, apparently, is there any provision for the Licensing Authority to take steps to modify the licence if it sees cause to do so during its currency. For example, the Licencing Authority may attach to a licence a condition with respect to the places between which passengers or goods are to be carried. Once such a condition is put upon the licence it does not appear to be possible for either the Licensing Authority or the licensee to alter this in any way until the expiry of the licence. It is possible to conceive of the difficulty a licensee would be in if the aerodrome at his destination point became waterlogged or unusable, with another one available at a neighbouring town ten miles away. It would not, apparently, be legally possible for him, even with the consent of the Licensing Authority, to alter his destination to the new town, except by the somewhat laborious process of surrendering his licence for cancellation and applying for another one.

It is hoped that the operators of aircraft in this country will make themselves acquainted with this new burden of regulation which is put upon them, and before it is too late make representations to the proper quarter, if, as practical men, they feel that the burdens laid upon them are too heavy. Once the Order is issued in its final form there will be little prospect, except after a lapse of a considerable time, of getting any alteration made. Needless to say, anyone bold enough to ignore the Order can be suitably dealt with under a paragraph which provides for the prosecution of any person who acts in contravention of the Order or his licence.

Remembering that the Order, when it is issued, will bear such a strong resemblance to the Road Traffic and Road and Rail Traffic licensing procedure, it may be suggested that those who will be interested in the air equivalent should ask any operator of buses or lorries of their opinion of that procedure and give heed to the replies which they will receive.

SERVICE AVIATION

STRENGTH FOR THE EAST: A Short Sunderland long-range flying boat of the type now being supplied to Singapore, with a background of Singapore IIIs.

East Coast Exercise

AS briefly announced in *Flight* of June 16, air, sea, and land forces will be engaged in a combined exercise along 400 miles of our eastern seaboard during four days toward the end of this month.

The attacking force will comprise four battleships, an aircraft carrier, four cruisers, fifteen destroyers and five submarines; opposing this will be a skeleton naval force supported by land fortresses and 145 aircraft including Ansons, Stranraers, Vildebeest IV's, Hurricanes, Gladiators, and Gauntlets.

The "war zone" will extend from the Moray Firth to the Thames. Objectives of the main enemy attack will be the Thames-Medway estuary, Harwich and the Tyne and Forth. Although coastal defences will be manned by nucleus garrisons, including heavy artillery units, the major defensive rôle will be played by R.A.F. squadrons. No fewer than eight general reconnaisance squadrons will patrol the North Sea and endeavour, in co-operation with friendly "Red" warships to locate the approaching "Blue" force.

Combined exercises round the British Isles and Singapore have proved unquestionably that in narrow seas the R.A.F. can deny undetected approach to enemy warships. The larger area concerned in the forthcoming exercise introduces a severer test for the reconnaisance machines which must search in relays thousands of square miles of open water. Later in the exercise the interception of Fleet Air Arm machines from the "Blue" carrier will test the efficiency of the home fighter organisation.

Night-Flying Procedure

AN Air Ministry order remarks that accidents have been caused during night-flying by aircraft swinging while taking-off or landing and striking flare-path personnel. It therefore enjoins that the number of personnel on the landing area should be kept to a minimum, and such as are necessary are to be grouped during night-flying in the rear of the floodlight or number one flare. Except in emergency, aircraft are not to be given permission to take-off or land unless the landing area upwind of the floodlight or number one flare is clear of personnel.

The Visit to France

ELEVEN Hawker Hurricane eight-gun fighters of No. 111 (Fighter) Squadron, and four Gloster Gladiators of No. 87 (Fighter) Squadron, attended by a Vickers Valentia bomber transport and two Avro Ansons, left Northolt last Friday for Villacoublay, near Paris, where nine Hurricanes and three Gladiators gave demonstrations. Wing Cdr. S. L. G. Pope, D.F.C., was Officer-in-Charge and Air Comdre. R. E. Saul, D.F.C., accompanied the party.

Poor weather prevented a record-breaking trip by the Hurricanes, but they reached Paris in 66 minutes. Presumably they were forced to throttle back to allow the escorting Amiot bombers and Dewoitine fighters, which went out to meet them, to keep formation.

The Hurricanes' show was very well received. The programme was: Take-off by flights; squadron formation; line abreast; medium turn; break up; landing by flights. The Gladiators put up their usual impeccable display which took the following form: Rocket loop; half roll off top; stall turn; half upward roll and loop; slow roll; three loops; upward roll; half upward roll; loop and slow roll; half roll off loop.

The necessary ground staff and spare equipment went over in the Valentia and the Ansons. During the stay the officers were to have attended an official dinner in Paris.

New French machines taking part included the Potez 63 (see photograph on page 38) and the Amiot bomber, similar to the machine in which Rossi lately broke a series of world's records.

On Sunday Group Capt. Orlebar flew from Northolt to Villacoublay (235 miles) in 55 minutes in a Hurricane.

Leave for Medically Unfit

AS from June 22, 1938, the effective date of discharge of an airman invalided from the service will be deferred for 28 days, and leave granted for this period.

Hurricanes for 56 (F.) Squadron

NO. 56 (Fighter) Squadron, stationed at North Weald, Essex, has been equipped with Hawker Hurricane eight-gun single-seater fighters. The Squadron will use its new equipment during the combined exercises to take place at the end of this month. It is commanded by Sqn. Ldr. C. L. Lea-Cox.

Permanent Commissions

THE undermentioned medical officers have been selected for permanent commissions, subject to physical fitness:—Flt. Lts. James Colman Bowe, M.B., B.Ch., D.P.H., John Howard Neal, M.R.C.S., L.R.C.P., Robert Henry Pratt, M.B., B.Ch., Leslie Norman Trethowan, M.R.C.S., L.R.C.P., John Brown Wallace, M.B., Ch.B., and Ralph Forbes Wynroe, M.B., Ch.B., D.M.R.E.

The Air Force List

THE July issue of the *Air Force List* has now been published. It can be purchased (price 4s.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

Orders for Sunderlands: A New Bomber

REPORTS state that a very large order has been placed for the Short Sunderland flying boat which has four Pegasus engines—presumably XXs. This machine, which has nose and stern turrets, is, of course, the military version of the Short Empire boats, and should have a top speed of over 200 m.p.h.

Another interesting report deals with the order of a large number of wings of the Sunderland type, to be used in the construction of new bombers. This adaptation should speed up production of the new machine considerably, and by removing the need for new jigs and tools a great economy will be effected.

New V.R. Centres

THE Air Ministry announces the opening of two further R.A.F. Volunteer Reserves training centres. The total of such centres is now 27. The new centres are at Luton and at Meir (Stoke-on-Trent). Applications for training as pilots are invited immediately from candidates resident in those districts. They should be addressed to the Air Officer Commanding No. 26 (Training) Group, The Hyde, Hendon, London, N.W.9.

Candidates must be between their 18th and 25th birthdays, be physically fit and have had an education approximately up to the standard of the School Certificate. Previous flying experience is not required. The initial period of service will be five years, with opportunity of extension. Selected candidates will be entered as airman pilots with the rank of sergeant. Later they will have opportunities of promotion to commissioned rank on merit. Training will be at week-ends and in the evenings with a continuous period of 15 days annually at, so far as possible, the convenience of individual pilots.

Pilots who carry out the required training and reach the required standard of proficiency will receive a retaining fee of £25 a year. Pay and allowances will be given during continuous training and an allowance for expenses at other training times.

R.A.F. Squash Rackets Association

SQN. LDR. G. COMBE has taken over the duties of hon. sec., R.A.F. Squash Rackets Association. His address is: Hon. Secretary, R.A.F. Squash Rackets Association, Chemical Defence Experimental Station, Porton, Nr. Salisbury, Wilts.

Scottish Sharks

THE first Shark to be rebuilt at the new Dumbarton factory of the Blackburn Company recently underwent successful test flights at Abbotsinch. The second machine is also on test in the hands of F/O. Rolfe, a Blackburn test pilot. No new types are under construction at the Clyde works as yet, but it is planned to transfer flying boat work to Dumbarton.

Moves and Transfers of Bomber Squadrons

THE following moves will take place with effect from the dates stated:—

Unit.	From	To	Date.	Remarks.
No. 102 (Bomber) Squadron.	Honington.	Driffield ...	11.7.38	Transferred to No. 4 (Bomber) Group.
No. 75 (Bomber) Squadron.	Driffield ...	Honington.	11.7.38	Transferred to No. 3 (Bomber) Group.
No. 77 (Bomber) Squadron.	Honington.	Driffield ...	25.7.38	Transferred to No. 4 (Bomber) Group.
No. 215 (Bomber) Squadron.	Driffield ...	Honington.	25.7.38	Transferred to No. 3 (Bomber) Group.

Central Flying School Categories

THE undermentioned reserve officers have recently been tested at the Central Flying School, and are awarded the following categories:—*Category A.1*: F/O. W. L. B. Palmer. *Category A.2*: Flt. Lts. N. J. Capper, A. D. Bennett, H. A. de S. Barrow, and H. L. McCullock. *Category B*: Flt. Lt. L. T. G. Barber.

Merlins III and IV

IN succession to the Merlin's I and II at present in service, the Rolls-Royce Merlin III is about to be introduced. In general construction and power output this engine resembles the Merlin II, but embodies a standardised airscrew shaft suitable to take De Havilland or Rotol v.p. airscrews. So far, the v.p. Merlins in service have been equipped with D.H. airscrews only. Another modification on the new engine is the provision of a dual drive for accessories at the front end.

For installation in the Armstrong-Whitworth Whitley IV bomber, the Merlin IV has been developed. Other Whitley models, namely I, II and III, are powered with fourteen-cylinder Armstrong-Siddeley Tiger VIII or IX radial engines. The Tiger VIII in the Whitley II and III has a two-speed supercharger and gives a maximum of 780 h.p. at 14,250ft.

No detailed information has been released about the supercharging or power figures of the Merlin IV, but output and construction are in general the same as those of the Merlin III, including the modifications mentioned above. One important difference exists, however: where, as hitherto, Merlin engines in service have been ethylene-glycol-cooled, the Merlin IV is cooled by water under pressure. This has the effect of raising the boiling point of the water well above 100° C. and avoids the difficulties of draining and supply of glycol. No doubt troubles had to be overcome in connection with joints in the pressure water system.

The already creditable performance of the Whitley is considerably improved with 1,000-h.p., water-cooled, in-line engines.

R.A.F. Recruiting Returns

RESULTS for the first two weeks of the R.A.F. recruiting campaign for 31,000 pilots, observers, airmen and boys, have been announced by the Air Ministry.

The total number of inquiries during the first week was 6,979, made up as follows:—Airmen, 4,837; boys, 1,044; pilots, 843; observers, 255. Of the 4,837 airmen, 1,731 have applied for admission and 628 have been drafted to the R.A.F. Reception Depot, West Drayton. Applications for pilots total 158 and for observers 53. The total number of inquiries during the second week was 6,015, made up as follows:—Airmen, 4,447; boys, 802; pilots, 639; observers, 127. Of the 4,447 airmen, 1,498 have applied for admission and 618 have been drafted to the West Drayton Depot. Applications for pilots total 113 and for observers 34. Returns from the eleven main offices for the first two weeks are as follows:—

Recruiting Office.	Total Enquiries.		Total Application.
	Men.	Boys.	Men.
Belfast	215	68	65
London	1,919	424	468
Newcastle	169	50	89
Bristol	165	26	67
Liverpool	368	79	144
Glasgow	470	99	204
Plymouth	154	21	52
Birmingham	472	83	127
Manchester	323	73	162
Leeds	399	76	158
Cardiff	181	45	60
Belfast	168	40	46
London	1,854	362	493
Newcastle	176	44	68
Bristol	137	24	50
Liverpool	288	45	121
Glasgow	398	63	176
Plymouth	135	23	54
Birmingham	481	65	124
Manchester	293	64	156
Leeds	341	44	152
Cardiff	176	28	58

Royal Air Force Gazette

General Duties Branch

The following Flying Officers are promoted to Flight Lieutenant on the dates stated:—R. G. Musson (May 7); H. M. Styles, H. D. Fraser, D. H. Lee (June 15); J. C. Taylor (June 22).

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—R. M. Fenwick-Wilson (March 24); L. W. Saben (May 20); R. W. Hase (May 25).

Wing Cdr. T. F. W. Thompson, D.F.C., is placed on the retired list at his own request (June 30); Sqn. Ldr. N. W. A. Cullum is transferred to the Reserve, Class A (July 6).

Equipment Branch

Group Capt. F. A. Baldwin is placed on the retired list at his own request (July 1).

Royal Air Force Reserve

General Duties Branch

Flt. Lt. J. R. S. Agar is transferred from Class A to Class C (July 2); Flt. Lt. H. F. Game, A.F.C., relinquishes his commission on completion of service (June 1).

Equipment Branch

W. B. J. Humphrey is granted a commission as Flt. Lt. in Class C (February 16).

Auxiliary Air Force

General Duties Branch

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—F/O. P. Gifford is promoted to the rank of Flight Lieutenant (April 1).

Equipment Branch

Major E. J. Moorhead (R.A., Retd.) is granted a commission as Flight Lieutenant (May 16).

Royal Air Force Appointments

General Duties Branch

Wing Commanders.—P. F. Fullard, D.S.O., M.C., A.F.C., to H.Q., Maintenance Command, London; for Air Staff duties, 20.6.38. C. Findlay, D.F.C., A.F.C., to R.A.F. Station, Wyton; to command, 20.6.38. H. A. Hamersley, M.C., to U.L.A.S.; to command, 30.6.38.

Squadron Leaders.—J. H. McN. Campbell, to H.Q., No. 26 (T.) Group, Hendon; for Navigation duties, 30.5.38. P. L. P. Marett, to No. 37 (B.) Sqn., Feltwell, for flying duties, 18.6.38. C. H. Turner, to R.A.F. Station, Halton; for flying duties, 18.6.38. C. F. Sealy, to Special Duty List; whilst employed with the Superintendent of Design, Royal Arsenal, Woolwich, 23.5.38. A. B. Woodhall, to Directorate of Staff Duties, Air Ministry, 27.6.38. N. A. P. Pritchett, to Deputy Directorate of Organisation, Air Ministry, 20.6.38. J. Cox, to H.Q., R.A.F., Iraq, Habbaniya; for Personnel Staff duties, 1.6.38. G. D. Emms, to No. 79 (F.) Sqn., Biggin Hill; to command, 20.6.38. F. W. Stannard, to H.Q., Bomber Command, Uxbridge; for Air Staff duties, 16.6.38.

Flight Lieutenants.—G. W. Montagu, to No. 2 A.-A.C. Unit, Lee-on-Solent, 13.6.38. W. Gill, to Aircraft Depot, Habbaniya, Iraq, 28.5.38. R. V. McIntyre, to No. 84 (B.) Sqn., Shaibah, Iraq, 25.5.38. T. U. C. Shirley, to H.Q., R.A.F., Far East, Singapore, 11.6.38. W. H. Kyle, to No. 3 F.T.S., South Cerney, 25.6.38. D. M. Lynch-Staunton, to R.A.F. College, Cranwell, 20.6.38. J. G. Cardale, to School of Air Navigation, Manston, 19.6.38. J. J. A. Sutton, to H.Q., No. 4 (B.) Group, Linton-upon-Ouse, 13.6.38.

Equipment Branch

Wing Commander.—N. R. Fuller, to H.Q., Coastal Command, Lee-on-Solent; for Equipment Staff duties, 28.5.38.

Squadron Leader.—L. V. Hirst, to H.Q., Bomber Command, Uxbridge; for Equipment Staff duties, 14.6.38.

Flight Lieutenant.—J. R. Fraser, to R.A.F. Station, Debden, 30.5.38. W. A. Lee, to Directorate of Equipment, Air Ministry, 16.6.38.

Medical Branch

Squadron Leader.—A. L. St. A. McClosky, to R.A.F. Station, Abingdon; for duty as M.O., 27.6.38.

Flight Lieutenants.—I. K. Mackenzie, to R.A.F. Station, Helwan, Egypt, 11.5.38. J. H. Preston, to R.A.F. Station, Ismalia, Egypt, 10.5.38. C. C. Barker, to R.A.F. Station, Habbaniya, Iraq, 27.5.38. F. L. Whitehead, to H.Q., R.A.F., Middle East, Cairo, Egypt, 1.6.38. J. R. Cellars, to No. 4 F.T.S., Abu Sueir, Egypt, 1.6.38.

Owing to the greatly increased length of these lists as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

Service Aviation

Portuguese Officers Attached

THE undermentioned Officers of the Portuguese Air Force have been attached to No. 5 and No. 7 F.T.S., from Monday, July 4, until the completion of the Course:—

Lt. Joao Maria Amado da Cunha e Vasconcelos de Carvalho and Sec. Lt. Jose da Silva Correia, to No. 5 F.T.S., Chester. Sec. Lt. Nuno Alves Calado and Sec. Lt. Benjamin Ternando Fonseca de Almeida, to No. 7 F.T.S., Peterborough.

Training in Canada

IT has been announced by Mr. Mackenzie King, the Canadian Prime Minister, that Canadian flying schools will provide instruction for R.A.F. pilots. There has been a good deal of controversy on the subject in Canada, but it now seems that the intention of the Canadian Government is to recruit R.A.F. volunteers in Canada and to train them in the Royal Canadian Air Force to British Air Ministry standards. Transfer to the R.A.F. would automatically follow on qualification. Expansion of Canadian flying schools is visualised.

At present British schools are training a considerable number of Dominion pupils from Canada, Australia and New Zealand.

The Canadian Air Force, at the moment, has a strength of 181 permanent-commissioned pilots, 82 "non-permanent"-commissioned pilots (similar in status to our Auxiliary officers), and thirty or forty airmen pilots.

Should the present plans go into operation some considerable expansion of the Canadian instructional staff will undoubtedly become necessary to deal with the increased work.

Aircraft Apprentices School at Cosford

THE new R.A.F. school at Cosford, Staffordshire, will form on July 15. It will be used for training aircraft apprentices as fitters. A substantial number of airmen will also be trained as flight riggers and flight mechanics.

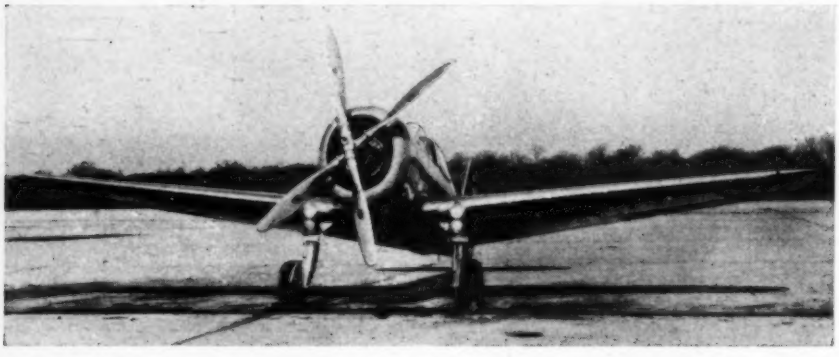
The school, the buildings for which are being erected on a site of nearly 660 acres, will open in August with 250 new entrants and 500 apprentices transferred from No. 1 School of Technical Training, Halton. This complement will be increased gradually to a total of approximately 4,000. It is anticipated that this figure will be reached next year. The educational and technical staff will then number about 450.

The educational and technical training on the three-year apprenticeship course will be similar to that given at Halton, where nearly 5,000 boys are under training. There will be nearly 2,000 vacancies in the next twelve months for boys between 15 and 17 years of age.

Cosford will be known as No. 2 School of Technical Training (Apprentices) and it will be placed in the Training Command in No. 24 (T.) Group. Its chief will be Group Capt. Guilfoyle.

Albrighton (G.W.R.) is the nearest station (1½ miles) to Cosford and the full postal address is:—No. 2 School of Technical Training, Royal Air Force, Cosford, Albrighton, Staffs. (*Telegraphic address*: Aeronautics, Albrighton.)

FOREIGN SERVICE NEWS



CO-AXIAL: A Curtiss P-35 pursuit monoplane (Twin Wasp) of the U.S. Army Air Corps fitted experimentally with concentric airscrews.

A New Browning

THE Belgian Air Force is experimenting at Ostend with a new Browning machine gun manufactured by the Fabrique Nationale d'Armes de Guerre who, of course, make the famous Browning automatic pistols. The new gun is said to be capable of firing at the rate of 1,800 rounds a minute. It has been developed directly from the gun now in service in Belgium. Experiments are being conducted on a Fairey Kangouroo which has four guns mounted outboard in its upper wing.

The rate of fire of the older gun was raised through continuous development work from 800 to 1,200 rounds per minute.

Co-axial Airscrews

FOLLOWING reports of experiments in America with twin airscrews on a single-engined Curtiss P-35 pursuit monoplane comes notification of the first test flight of the Koolhoven FK55 single-seater fighter, which has a similar airscrew arrangement and a Lorraine Petrel engine mounted in the fuselage.

Lt. H. M. McCoy, who superintended development of the Curtiss installation at Wright Field, in a statement to the Press said that the appreciable increase in speed of military aircraft, especially that of fighters, has in the past few years made the application of this type of airscrew of increasing interest. The main benefits to be gained by the use of the dual installation over the single airscrew are the reduction in diameter for equal powers and the negation of engine torque, all with no loss in propeller efficiency at high speed.

A possible future application is to be made to small machines fitted with engines—when made available—of double the present powers. Experiments show that it would be possible to double the power of existing types of aircraft without increasing landing gear length or airscrew diameter.

The Renard Fighter

TRIALS with the new Belgian Renard R.36 single-seater fighter monoplane (Hispano-Suiza Series Y engine) have shown that the top speed is more than 310 m.p.h. Trouble was experienced with the retractable radiator, which has now been replaced by one of more normal design under the fuselage. A small series of six machines is nearly finished. One will have clipped wings, another one an extra seat and dual controls, and a third a two-row radial engine. Hitherto the Renard concern has specialised in reconnaissance machines and trainers.

OFF THE LINE: Potez 63 fighter-bombers of France's *Armée de l'Air*. This type, which is now in quantity production, has two 750 h.p. two-row Hispanos. These machines were represented at last Sunday's meeting at Villacoublay.

PRIVATE FLYING

Topics of the Day

Bad Names

ON several occasions I have alluded, perhaps wrathfully, to the considerable conservatism of so many pilots, and of a few instructors in particular. At the same time I have given this peculiar state of affairs the blame for the fact that many aeroplanes have so easily been given bad names.

Everybody remembers how gossip was built up, for instance, around the tapered Hornet, and it would not be difficult to think of two or three other machines of the same class which have been damned—if not without reason at least without fair reason. The latest victim is the Miles Magister. First we were told that it couldn't be recovered from a spin, and now we are told that one of its little ways is to "get fixed in an uncontrollable spiral dive."

In order that there shall be no suggestion of bias, let two things be admitted straight away. The Magister is not similar in its characteristics to the erstwhile conventional trainer, and there is no reason why it should be. Sooner or later the pupils trained at Reserve schools will probably be expected to fly low-wing machines in which similar characteristics will be found. In fact, there is hardly a single new type going into service which is not a cantilever monoplane. If we are to be sentimental about a pupil's training difficulties, then we should logically be equally sentimental about his later difficulties with weapons like Hurricanes and Spitfires.

The second point is that the Magister has not been without fault. In its original form it could, in a certain very particular condition of loading, be stable in a spin. The loading condition was, however, very critical indeed, and was only discovered at Martlesham after the type had gone into production. Certain modifications were immediately made to the tail, which effectively cured the trouble. Now, after this spiral dive business, a change is, I believe, to be made in the rudder design. And if anyone wishes to throw a stone may I say that glasshouses are very, very brittle?

Personal Experience

AFTER no more than an hour's flying in the Magister I was certainly not in a position, before last week, to say that this diving business was all nonsense, though in the course of that hour I had carried out most of the manœuvres (without noticing anything in particular) which were supposed to bring this trouble in their train.

More recently, filled with curiosity, primed with the facts and fortified with the moral support of a parachute and of Flt. Lt. Moir, the chief instructor at the P. and P. Reserve School, I went up in a Magister to try to simulate the conditions in which this alleged-to-be-stable diving characteristic becomes apparent. By the simple means of forgetting everything that I had been taught, the effect could certainly be reproduced, though its correction was so natural and obvious that I had the greatest possible psychological difficulty in letting the affair develop.

The reason for the peculiarity, if such it can be called, is simple enough. With the engine off, the machine develops, like many others, a natural turn to the left which is, in the ordinary way, automatically corrected by light pressure on the right pedal. If one's feet are entirely removed from the rudder bar while the machine is gliding, the turn starts, some bank is built up, the effect of the rudder bias depresses the nose a little, and any attempt to pull the nose up merely tightens the turn, so that eventually the machine is flying in a steep spiral dive. The greater the backward pressure on the stick the steeper the spiral—an obvious effect of control use and the simple cause of quite a lot of the trouble which is experienced when flying under the hood in any machine.

At any point during this steady building-up of gliding turn, opposite rudder is the corrective—and a perfectly natural one until, perhaps, the angle is so steep and the speed so high that recovery is not thought of in terms of rudder at all, but only in those of a wild endeavour to pull the nose up by means of the elevators, which are themselves making the turn.

Surely when a machine is making a gliding turn to the left one's natural control movements for a return to level flight are right rudder and right stick. The effect can very easily be reproduced in any aeroplane simply by holding a little left rudder (or using the rudder bias gear, if fitted) during the glide and endeavouring to correct the steadily increasing turn and bank by the use of the elevator. I tried it myself a day or two later in another machine, and though the nose could, with difficulty, be brought up, the result was a full stall. Opposite aileron would stop the turn in this case—as it will in the Magister if you care to risk the spin-providing effect of aileron drag. But nobody would think of correcting a steep gliding turn by such measures alone unless the rudder was out of action.

Primary Training

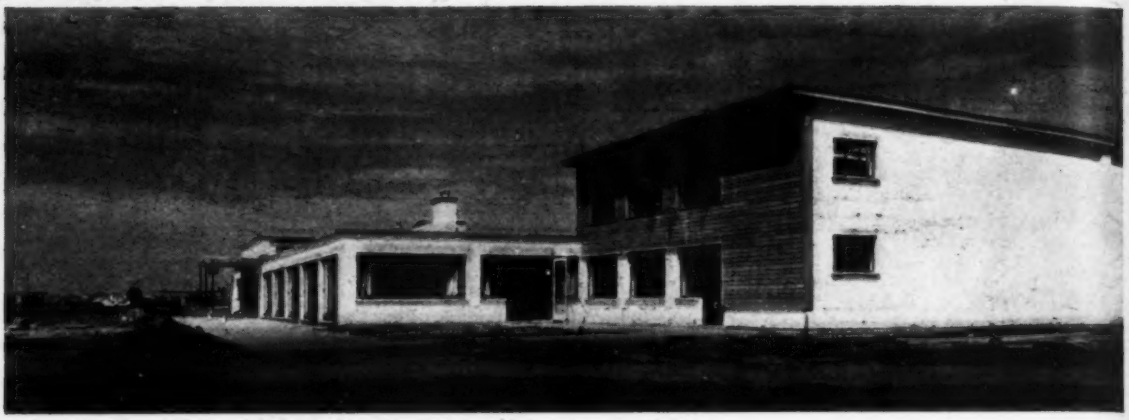
STATED in so many words the whole thing may appear to be complicated, difficult and (still) even dangerous. But the correction is so natural and obvious that to describe the sequence of cause and effect is rather like starting to write a handbook on primary training for pilots.

Curiously enough, I found the effect most difficult to reproduce after the very manœuvres, spins and loops, which appear to have caused most of the trouble. Probably the fact that it was necessary to concentrate to some slight extent on such manœuvres and, in particular, on the business of keeping the machine perfectly straight both during the loop and after the spin, made it difficult to remember to do the wrong thing—which is to stop making use of the rudder altogether.

In the course of our bad flying exhibition the machine was forced down in a really steep dive while the rudder was left to itself. Even at an air speed of 180-200 m.p.h. the amount of rudder correction to stop the turning motion was very small and the pressure required only what might have been expected. If the spiral dive in its slowly reached later stages can be considered panic-making and strange to the novice pilot, the fact remains that the turn should, with normal flying training, never have been allowed to develop. I do not remember ever having been told that gliding turns could or should be stopped or reversed without the use of a reasonable amount of opposite rudder, if only to counteract the effects of plain aileron drag. The combined rudder and stick movement are taught in the first hour of dual flying life, and later on the synchronised movements are as instinctive as those involved in riding a bicycle.

INDICATOR.

Private Flying



Designed for expansion—the Ipswich buildings, which may be enlarged without upsetting the architectural balance.

IMPLEMENTING IPSWICH

Suffolk Air Day : The New Terminal Building at Ipswich Airport is Officially Opened

WHETHER or not Suffolk Air Day would be considered important enough in the ordinary way for extensive Service support, the nearness of Ipswich to both Martlesham and Felixstowe meant that really adequate support was given last Saturday when the aerodrome terminal building was officially opened by the Under-Secretary of State for Air, and when, later, the Air Day got into its stride. This part of the world is by no means famed for the local inhabitants' interest in flying, and it says much for the energy of the staff of the Straight Corporation, which now operates the aerodrome for the Corporation, that something like 30,000 people turned up in spite of weather conditions which were far from favourable. Although there were only two really violent rainstorms during the afternoon, there was quite a high wind, and this wind was a distinctly cold one.

The aerodrome at Ipswich has had a somewhat chequered career, which was briefly outlined by Councillor E. C. Ransome, the chairman of the Airport Committee, in his speech prior to the opening ceremony. He explained how the aerodrome was originally opened in 1930 when the Eastern Counties Aero Club took it over; later on, in 1932, Brian Lewis and Co. did their best to promote interest in the district; and in 1935 the aerodrome was taken over by the Straight Corporation. This time there should be good results. Not only is there an adequate fleet of training machines, but the new clubhouse and terminal building, with its squash courts and other facilities, should attract even the most ardently non-flying members of the general public. Councillor Ransome explained how, in the case of flying, the supply had to precede the demand, and paid tribute to the work of Alderman Rands, the previous chairman of the Committee, who had done so much of the original work.

The second speaker after the formally informal lunch was Mr. Whitney Straight himself. He first of all explained what a good thing it was that Capt. Balfour was himself a pilot, and then emphasised the up-to-dateness of the airport buildings, which were such important items in the business of attracting people to an aerodrome. In the course of his remarks about the new Under-Secretary, he mentioned that Capt. Balfour had been in charge of the Air Council's D.H.86B in which he had arrived, and some minor amusement was caused when Capt. Balfour later denied his conspiracy in the matter.

Aerodrome Policy

In an extremely sound speech Capt. Balfour admitted that the municipalities had cause for grievance in that the aerodrome requirements of a few years ago were now considered to be officially inadequate. It was not, however, possible to foretell the future, and he hoped that the present burden on municipalities would have disappeared in ten years' time. Though, as he explained, it was not the Government's policy to provide direct assistance for aerodrome operation, help, in the form of radio and night-flying equipment, would be given where necessary, and recently a survey of civil airports had been made to judge of their use and value in the expansion scheme. The Government tried to hold a balance between the extremes of direct assistance and of no assistance at all.

When Capt. Balfour had declared the building open, the real part of the day's programme started with a fly-past, in heavy rain, of three Service boats from Felixstowe. There is something particularly impressive about a large flying-boat cruising at zero altitude over a land aerodrome, and the Short Sunderland, which led the formation, certainly gave people an idea of what was being done in the way of flying-boat development. This impressive machine was accompanied by two older types, a Saro London and a Supermarine Scapa.

Thereafter the various machines used by the Straight Corporation at Ipswich were paraded on the ground and in the air, and it must be admitted that a Magister in the Straight colour scheme is a singularly attractive object. Among the other machines were larger types, such as Scions and Dragons, which are used both for Army co-operation and for joy-flying at Clacton. Incidentally, machines are regularly flown over to this resort, and the service is a useful and much-employed one.

The conditions earlier in the afternoon were not at all favourable for parachute drops, but Mr. Benno de Greeuw made his descent later from the Scion and succeeded in executing a landfall nicely outside the public enclosure. In the interim Mr. Giles Guthrie put up a really impressive show with his Mew Gull, flying the machine at various speeds.

The weather conditions, again, hardly suited the pilots of the three Gloster Gauntlets from No. 46 (F) Squadron, but in spite of the very considerable bumps their aerobatic formation work was very fair indeed. Other Service types to be demonstrated were the Bristol Blenheim, the Handley Page Harrow, and the Vickers Wellesley. Unfortunately, the Hawker Hurricane, which should also have been demonstrated, could not be started. Apparently, the starter mag. had faded out, and all the efforts of aircraftmen at the handle failed to evoke even a splutter. The pilot stayed the night, and, with spares which he brought over in a Hind from North Weald, the demonstration was carried out according to programme the next morning, though before a somewhat reduced number of spectators.

Equally unfortunate was the fact that the long-awaited "dragon," which was to be shot down by two bearded sportsmen in Magisters, failed to rise at all. All the work expended on the job of fitting it with hydrogen (in the absence of helium in reasonable quantities) was spoilt by a heavy rainstorm, which increased its gross weight to such an extent that it could only be made to ground-loop dismally, and the marksmen's aim at such a low level was completely ruined by the prevailing bumps. However, at the end of the day the public saw two or three of the very latest types (from Martlesham) in the air;

ADDITIONS at DESFORD

Leicester's Service Training Centre

Illustrated with "Flight" Photographs.

DESFORD, the headquarters of No. 7 Elementary and Reserve Flying Training School, was opened in December, 1935. Even then it boasted a smart and modern club building and hangars. Recently the addition of Reserve quarters and new control buildings has greatly enhanced this school, which is operated by Reid and Sigrist, Ltd. The new buildings were actually designed by Sqn. Ldr. Reid.

A separate air-conditioned building houses the new Link Trainer.

Above is seen the pleasant vista from the lounge. On the left, Sqn. Ldr. "Taffy" Jones may be distinguished outside the doors and the new Reserve building is in the background. On the left, below, is what must surely be the lowest-altitude aerial photograph on record. Taken from a machine coming in, it shows the fleet of Tiger Moths and Harts. The deep windows of the instructors' new room are just visible. (Below) The Chief Instructor, Mr. George Lowdell (seated), arranges the afternoon's activities.

"Flight" photograph.

The upper part of cumulus and cumulo-nimbus storm clouds in process of "growing." Clouds of this type usually have a characteristic flat base.

PHILIP WILLS, the author of this article, is a sailplane pilot of outstanding ability. Unless his achievements have been bettered during this week's National Gliding Contests by the time these words appear, he holds both the British distance record at 206 miles and the British height record of over 10,000 ft.

Telling the story of his altitude flight in "The Times" last month, Mr. Wills gave a vivid description of sailplane cloud-flying :—

"... Entering a big cloud in a sailplane is a very different experience from doing the same thing in an aeroplane, for in the powered craft the general noise and vibration overshadow the subtler flavours of flight. I had the feeling that we had been silently absorbed by a large and immensely powerful octopus. The rush of air over the wings and body of the machine took on a different key and became smoother and quieter. One felt as though entrapped in an envelope of sticky power. The hue of the surrounding vapour, a bluish black, was octopus-like too. This, of course, was due to the great thickness of the cloud at this point, for I subsequently discovered it was more than a mile high. It is only the shallower clouds or the fringes of the big ones which assume the friendly hues of white or light grey..."

In this special article for "Flight" he discusses some of the finer points of this rather grimly fascinating pastime.

SAILPLANE CLOUD-FLYING

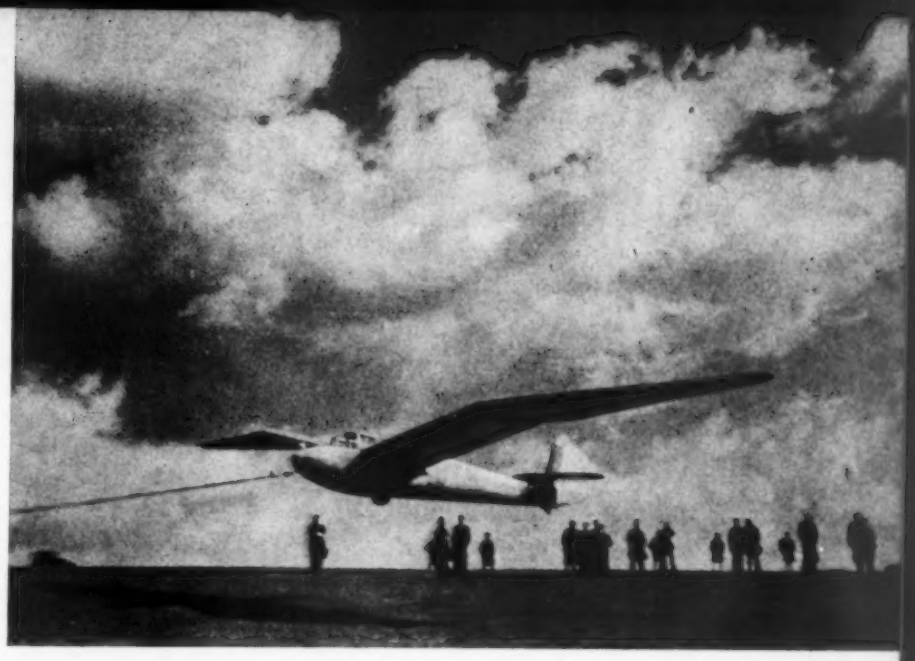
By PHILIP WILLS

Niceties of a Specialised Sport : Differences in Technique which the Power Pilot Must Learn

BLIND flying in sailplanes is a branch of the sport which has hitherto been little practised in England. This is partly, no doubt, because many people find difficulty in classifying it as a sport. To approach a large and boiling storm cloud embodying countless thousand horse-power of suck, to attach yourself deliberately to this invisible hook, to be tossed violently up and down (but chiefly up) in a thick fog, and to be ejected, possibly alive but certainly bilious, near the top, is not most people's idea of fun. Of course, there are compensations. The grandeur of the scenery when you emerge is one.

Schools of thought on the subject may be divided into two classes: (1) Don't do it. (2) Don't be silly, it's easy. We needn't worry about Class 1; they will all in due course be run over by motor buses—an end which everyone's aunts regard as fitting, dignified, and, therefore, hardly to be deplored. Class 2, however, should be encouraged, but not to break their necks. Indeed, one may say that everybody starts off in this class, but a large percentage suddenly retrogress into Class I after a little experience. Blind flying in sailplanes is *not* easy, as some fifteen or more of the best German pilots who have parachuted out of clouds could testify.

In the first place, then, why is it more difficult than blind flying in aeroplanes? The answer is, first, that aeroplanes usually blind-fly in *stable* cloud, i.e., low mist, fog or stratus, and these offer quite smooth flying. The sailplane pilot blind-flies only in *unstable* clouds, i.e., cumulus or cumulo-nimbus, for it is owing to their instability that he gets there. Further, in these conditions he generally has to perform numerous more-or-less tight circles at speeds of from 5 to 15 m.p.h. above the stall, a



The Minimoa sailplane in which the author of this article secured the British height record of over 10,000ft.

feat which would quickly confuse all but the best aeroplane pilots. Then he is not rich enough to buy (and, anyway, does not go fast enough to drive) the various out heavy instruments which the power pilot uses to reduce fatigue whilst in cloud.

It seems possible that even power pilots underestimate the difficulties of blind flying. The thing is that it is quite easy unless and until you get into trouble, when in the twinkling of an eye it becomes very difficult indeed. A sudden attack of vertigo, unless one is already trained to overcome it, makes it literally impossible to retain control. One can call to mind many accidents which probably arose from rough conditions encountered inside clouds; a recent case, no doubt, was the fatal accident involving the R.A.F. boxing team in South Africa; and such crashes induce in one a feeling of wonder that the "B" pilot's licence does not require recovery from spins or high-speed spiral dives under the hood, or, as in more advanced countries, any knowledge of sail-flying.

Incidentally, one quite reliable source of news produced a semi-official theory that the South African crash might have been caused by the machine hitting a vulture in the middle of the cloud. It does not seem widely known that even birds are unable to fly blind for long. They, too, evidently experience vertigo induced by the Eustachian tubes of the inner ear (irreverently called the Nasturtiums) and blindfold pigeons have been dropped from an aeroplane and in every case have eventually gone into high-speed spiral dives and the like, ending up in desperation with a parachute descent with the wings outstretched at a large dihedral angle. Few birds can be seen flying even on a misty day, and I cannot believe any have ever been encountered in clouds.

Stop Me and . . .

The size of the hailstones which fairly commonly emerge from South African clouds prove that up-currents of over 200 m.p.h. must occur inside them. So it is likely that a knowledge of the meteorology of motorless flying is of greater assistance to the blind pilot than a knowledge of ornithology.

The primary reason for the violent up-currents existing in clouds is to be found in the physical laws concerning the Latent Heat of Evaporation. It requires more heat to convert a pound of water at 100 deg. C. into a pound of steam than it does to heat that water from normal temperatures up to the boiling point. This is reversible; all this heat is liberated again when the steam condenses. Similarly, when the water vapour in a rising, cooling current of air eventually condenses and forms a cloud, there is a release of heat which starts the air rising again. If the up-current so caused reaches a speed greater than 8m./sec., any raindrops which form will be split up and carried upwards again, and this generates electricity in a big way. So the presence of a thunderstorm indicates up-currents of over 8m./sec.

Hail is formed in rather the same way; the individual hailstones have each fallen and been lifted by up-currents several times during their formation, like the balls on jets of water one sees at fair-ground shooting galleries. Hailstones weighing over 1 lb. each occur in South Africa. The up-current needed to lift such a lump of ice can be imagined but not negotiated.

Observe the smoke rising from a cigarette. For a short distance it ascends smoothly in a steady stream, but at a definite point this stream suddenly breaks up and dissipates in an extremely turbulent way. It is possible that strong up-currents inside clouds may in certain circumstances behave in the same way, the break-down of steady flow depending on their speed and cross-section.

What armour, then, should the sailplane enthusiast don to tackle these redoubtable adversaries? In the first place, he clearly needs a very strong machine. Sailplanes designed for cloud-flying have factors up to 12. But here comes a difficulty. In order to give good lateral control at speeds near the stall, considerable wash-out is necessary on the wingtips. In inverted flight this wash-out becomes, in effect, wash-in, so that at high speeds whilst inverted the entire weight of the machine may be imposed on the wingtips, inevitably producing structural failure. It is probably true that the sailplane pilot in a modern machine is more or less safe in cloud-flying whatever happens, so long as he remains right way up. But if he meets gusts of sufficiently sharp a gradient to invert the machine (and, no doubt, such things do occur in certain clouds) it is clearly possible for any pilot, however skilled, to qualify as a Caterpillar.

Therefore, having bought a suitably rugged machine, the next two items are a parachute, and as much theory and practice of gliding meteorology as one can get. There seems to be no alternative to actual cross-country thermal flying as the method of obtaining this knowledge. One must learn to distinguish as far as possible between a "live" and a "dead" cumulus, i.e., one which is still forming or one which is merely dissolving; to decide where the up-currents forming it are to be found; and to obtain some idea as to which clouds are likely to be relatively friendly and which must be avoided.

If by the time one reaches this stage one has not died of old age (and, indeed, with the growth of technical facilities in this country the sailplane pilot's evolution has recently enormously accelerated), one then requires a fore-and-aft level to act as an A.S.I.—should the latter chance to ice up in cloud—and a turn-and-bank indicator. This should be an electrical one for choice, and, surprisingly enough, there is an English make which is at least as good as, if not better than, any foreign instrument specially designed for sailplane work which I have seen. One should then have a lot of lessons under the hood at the local light aeroplane club.

When you have once been spun under the hood and have recovered your senses sufficiently to think, you at last realise the nature of the problem you are up against. Those whose have not had this nauseating experience cannot appreciate the problem, often deny its existence (thus claiming a superiority even to the birds) and so may occasionally break their necks. More usually they get into a high-speed spiral dive whilst still fairly low in the cloud, and emerge in a Miltonian descent with the A.S.I. needle twice round the clock, the variometer in hysterics and the other instruments in knots.

After a number of spins and spiral dives under the hood one's reflex actions seem to be quickly subdued and, whilst some pilots still experience the vertigo and nausea, it becomes possible to control one's muscular reactions inde-

(*Concluded on page h.*)

BOMBING and INTERNATIONAL LAW

Some Observations on Recent Statements by the Prime Minister

By J. M. SPAIGHT, C.B., C.B.E., LL.D.

THERE is little need to introduce Mr. J. M. Spaight to our readers, as he is well known as a writer on international law, and as the author of "Air Power and the Cities" and numerous other books which have been reviewed in "Flight" as they appeared from the publishers

BOMBING has been very much in the limelight of late. Spain and China have shown abundantly the need for some rules upon the subject, and the question of regulation has, in fact, been taken up by our Government. The subject is being investigated, it has been announced, with a view to the placing of some concrete and practicable proposals before other Powers. What the rules proposed are likely to be is not yet known, but it may be possible to guess at the general direction which they will take from some recent remarks in speeches by the Prime Minister.

Mr. Chamberlain's own wish would be, no doubt, to ban bombing completely. We have always been prepared, he said in the House of Commons on February 23, 1938, to abolish bombing altogether if others will agree. Complete abolition, to be effective, however, involves the establishment of some kind of international control of civil aviation, and this, as we know from what happened at Geneva in 1932-34, is a proposal which certain nations are not prepared to accept.

All that will be possible, it seems, is to regulate bombing, especially with a view to the protection of the civil population. A system of zones immune from bombing in urban areas may be adopted. The arrangement made for the protection of the Shameen district of Canton may be taken as a guide. The recent experiment of appointing a commission of neutral observers to report on the facts of any actual air bombardment may also be developed.

Three Principles

One thing seems to be fairly certain. Any rules proposed will start from the idea of the military objective.

On June 21 Mr. Chamberlain laid down three rules or principles of international law as governing the practice of aerial bombardment. They were:—

(1) That deliberate attacks upon civilian populations are contrary to international law.

(2) That only military objectives, capable of identification from the air, may be bombed.

(3) That in bombing them airmen must take reasonable care not to bomb civilian populations in the neighbourhood.

These are laudable principles which should be embodied in a future code of rules. What was questionable in Mr. Chamberlain's statement of the position was his further remark that they are principles already established for land and sea warfare. He repudiated expressly the view that "new weapons make new laws."

Now, it is entirely beyond question that the practice of land and sea bombardment does not exclude attack upon civil populations, or make it obligatory to confine such attack solely to military objectives. It is true that there is a general rule of international law forbidding the deliberate killing or wounding of non-combatants, but that rule is qualified by usage in the special case of bombardment. That it is so qualified there is no doubt whatever. Both W. E. Hall and Oppenheim, the two greatest British authorities on international law of the pre-war generation, state that the bombardment of the houses and not merely the fortifications of a defended town is admitted by the existing practice of war. Such bombardment, says Hall, may be cruel, but it represents practice, and was extensively resorted to in the Franco-German War. "Destruction of private and public buildings through bombardment," says Oppenheim, "has always been, and is still, considered lawful, as it is one of the means of impressing upon the authorities the advisability of the surrender of a town." The Hague Regulations, he adds, do not prohibit it.

It is true that both Hall and Oppenheim were referring to the bombardment of a fortified and defended town of which the enemy is seeking to obtain possession. Is not that description applicable to Madrid, Barcelona, Valencia, and Alicante? In any case, even if they were not envisaging the cut-and-run air-raid upon a town in the hinterland, which there is no attempt to capture, their words are destructive of the unqualified proposition that in no circumstances may civilians be directly attacked, under the existing usages of bombardment.

It is right and proper that there should be a prohibitory rule to that effect. No one would wish to defend some of the recent bombardments in China and Spain. The rule should be that only military objectives are liable to bombardment in any circumstances, but it should be supported by reference not to land and sea practice but to *air* practice, as established in 1914-18. It would be perfectly sound to say that the first and second of Mr. Chamberlain's rules represent the usage of bombardment (according to declared intention) as built up in the Great War by the various belligerents, each of whom, according to his own published statements, used his bombers for attacking military objectives solely, never the civil population; and that the third rule is a necessary corollary to the other two if they are to be any real protection to non-combatants.

So based, the rules will not be liable to be challenged by those who are familiar with certain historical facts, as they would be if supported by reference to naval and military practice.

Pilots' Dilemma

New weapons may not make new laws, but when they are such revolutionary weapons as the bombing aircraft they need new laws to regulate their use. Air bombardment cannot be dealt with adequately on the basis of the existing law and practice of bombardment by the other arms; the whole subject is in a chaotic condition. What may or may not be done is uncertain. The bombing airman is left in a really impossible position. He has not even been told, authoritatively, what a military objective is. He will remain in that uncomfortable position until he has a code of rules for his guidance.

For nearly twenty-five years the present writer has been advocating the preparation of such rules. He made bold, indeed, to suggest a detailed code himself in the year before the Great War. If such a code, crude as that effort was, had been in existence, still better if a set of clear and workable rules had been drawn up in the last few years, some of the unfortunate and tragic occurrences in Spain and China might possibly not have happened. It would at least have been possible in that event to quote chapter and verse for a rule governing bombardment from the air. As it is, all that can be done is to refer to principles or rules of the older warfare, and these are of doubtful applicability, and, indeed, of dubious quality ethically.

The preparation of a special code is urgently necessary, and *now* is the time to create it, when recent events have brought the need for regulation home to the minds of all.

There may never be an opportunity so psychologically favourable again. That is the writer's excuse for ventilating the subject in the columns of *Flight* at the present moment.

R.A.F.
Units Visited

HULLAVINGTON

Training aircraft of No. 9 F.T.S. : Anson, Hart and Audax.

—No. 9 Flying Training School

By Major F. A. de V. ROBERTSON, V.D.

Illustrated with "Flight" photographs

"NEVER in the history of the Air Force have we had such good pilots turned out by the Flying Training Schools as we are getting now." That is the opinion which several squadron leaders have expressed to *Flight* in recent months, since the new concentrated training was introduced to meet the needs of expansion.

Such a testimony suggested that a visit to an F.T.S. working under the new system would be well worth while, and No. 9 F.T.S. at Hullavington amply confirmed that idea. Everything was a great contrast to what was seen at another school before the expansion started. In the old days the pupils, both short-service officers and airmen, knew nothing about flying when they went to an F.T.S. They stayed at the school for a year, and some of the staff felt that the time was too short—that two years would be better.

Now the whole training is crammed into ten strenuous months, and yet the result can be judged by the opinion of squadron leaders quoted above. But it must be clearly understood that the whole of the ten months is not spent at an F.T.S. The course is divided into three periods, of which the first is spent at a civil elementary flying school. From this the pupils emerge with a civilian "A" licence and can fly a Tiger Moth or other elementary training machine. After a short period at Uxbridge to learn the elements of drill, etc., they go on to one of the R.A.F. Flying Training Schools. Just before the expansion there were only two of those in the country, at Grantham and Sealand, for Netheravon had been closed and Digby reduced to a "care-and-maintenance" basis under the economy campaign. Abu Sueir in Egypt continued to cater largely for the overseas commands. Now there are ten F.T. Schools in Great Britain—at Leuchars, Brize Norton, South Cerney, Sealand, Netheravon, Peterborough, Montrose, Hullavington, Tern Hill, and Shawbury.

Before following the pilot pupils further in their career a few words may be said about Hullavington station. It lies five miles north of Chippenham, in Wiltshire, in the pleasant West Country. The nearest village is Stanton St. Quentin. No. 9 F.T.S. opened at Thornaby in Yorkshire in April, 1936, but in July of that year it received orders to move to Hullavington. The move was welcome,

Ground work : A lecture on navigation in progress.

(Above) Formation flying, of course, forms part of the instructional routine. "Echelon to the right stepped up" is not easy.

(Right) On the range: Target practice with Vickers guns. "Dud" rounds are introduced in the belts to cause stoppages.

and the staff much prefers the West Country to the North. Hullavington has a large and good aerodrome, and station buildings on an exceptionally fine scale were nearing completion at the time of our visit. These buildings are constructed of cream-coloured Bath stone, which gives a very agreeable effect as compared with the red brick which is usual on R.A.F. stations. Red brick has its merits, but when it is raw and very brick-reddish it is not exactly soothing to the eye. Of course, if an emergency occurred, one can imagine swarms of workmen with pots of paint hurriedly swarming all over the Hullavington mansions while a uniformed Royal Academician instructed them how to camouflage the whole into the similitude of pasture land, complete with grazing sheep and cattle. But for the moment the station is both cheerful and restful to the eye; and that emergency, we all hope, will not arise.

The comforts and recreations of the airmen are particularly well looked after. The kitchens are spotless, and the recreation rooms for N.C.O.s and aircraftmen, with their billiard tables, leather armchairs and other delights, would not disgrace a West End club. This is all very desirable, as the station is rather out in the wilds, and Chippenham, attractive in its way, does not exactly suggest a centre of hilarity. Of course, outdoor games are also organised on the station.

To return to our budding pilots. There are three entries in a year, each averaging about 50. About a quarter of the total have, in the experience of No. 9 F.T.S., been airmen, and it has so happened that this school has not had many direct-entry airmen pilots. Its airmen pilots have mostly come from the regular ranks of the R.A.F., and have a good experience of the Service. The officer pupils, on the other hand, are raw material, and for the most part expect to spend only four years in the R.A.F. The regular airmen come to the school in the rank which they already hold, while the direct-entry airmen pilots come as leading aircraftmen. On passing out from the F.T.S., all the airmen become sergeants. A regular airman pilot retains the rank of sergeant after his period as a pilot is over and he returns to his basic trade.

On entering the F.T.S. all the pupils join the Intermediate Training Squadron, which is commanded by the Chief Flying Instructor. The Air Ministry notifies the school how many pilots it requires for the various types of Air Force work, and the civil elementary school sends a recommendation with each pupil as to whether he should be trained for single-engined or twin-engined types. This recommendation is not binding on the F.T.S., but it is usually followed.

A term of thirteen to fifteen weeks is spent in the Intermediate Training Squadron, followed by a break of a fortnight. The object of this term's work is conversion from the elementary types, with which the pupils are familiar, to Service types. At Hullavington the "single-engined" pupils are put into Hart Trainers, and the "twin-engined" men into Ansons. Probably in due course Airspeed Oxfords will be substituted for the Ansons. At the end of the term the pupils should be proficient in flying either the Hart or the Anson. During the conversion course the pupils must do instrument flying, including a triangular cross-country flight under the hood and a cross-country flight of 50 miles out and return under the hood. They must also do two cross-country flights of 200 miles, night flying, formation flying, and a height test of climbing to 16,000ft. and remaining there for 30 minutes.

At the end of the term comes the examination for wings, provided that the pupils have passed their examination in ground subjects, of which more anon. In this test each pupil takes the Chief Flying Instructor up in the back seat from half to three-quarters of an hour, and if all goes well, as it usually does, the pupil is then passed as entitled to wear the pilot's badge. He then goes off on his fortnight's break, and doubtless enjoys himself amazingly. He has worked really hard, and those wings on his tunic are a

A typical group of pupils—wearing the standard flying kit—leave the pilots' room to be assigned their flying exercises.

testimony that the work has been well done.

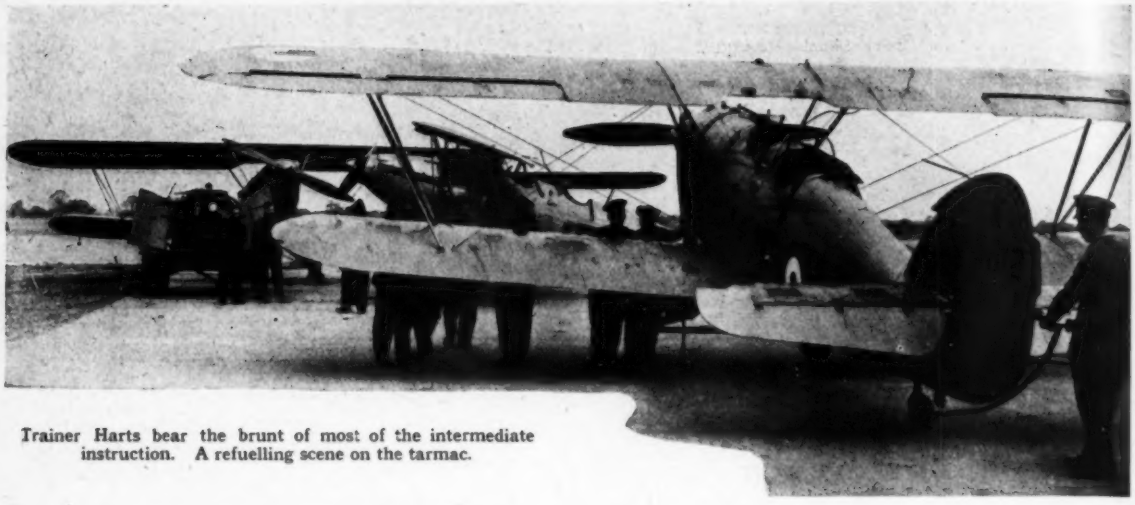
On return from this holiday all the pupils of the course pass into the Advanced Training Squadron. This squadron has its own C.O., and is not under the Chief Flying Instructor. The pupils have now learnt to fly Service types, but they still have to learn the use which the R.A.F. makes of its aircraft. In the A.T.S. they are divided into three groups: (1) Single-seater fighter, (2) medium bomber, and (3) heavy bomber. No. 1 group trains all fighter pilots, including those who will fly two-seater fighters. No. 2 group trains all pilots who will go to light bomber, medium bomber, torpedo-bomber, and army co-operation squadrons. No. 3 group trains for heavy-bomber, flying-boat and general-reconnaissance squadrons.

The pilots in Nos. 2 and 3 groups are now paired, and they are allowed to choose their own partners. Each pair always goes up together in the two-seater machines, each man working alternately as pilot and as observer. For obvious reasons the single-seater pilots are not paired, but each of them does a spell in a back seat to practise navigation. At Hullavington No. 1 group is trained on the Fury, No. 2 on the Audax, and No. 3 on the Anson.

The term in the A.T.S. lasts for from thirteen to fifteen weeks. In winter it usually lasts longer than in summer, because there is less good flying weather. Ground instruction goes on all the time, the squadron being divided into three squads, one of which works under the Chief Ground Instructor while the other two are in the air. For the last four weeks of the term the whole A.T.S. moves bodily, the pupils flying their own machines, to an Armament Training Station. This move is a governing factor in the last weeks spent at Hullavington, because the men must be able to use their guns and their bombs, or it would be useless for them to go to the ranges, and therefore instruction tends to concentrate on armament and bomb sights. The Armament Training Station ends the course at the F.T.S., and by that time each pupil has, since his promotion into the Advanced Training Squadron, done fifty hours dual and solo in the air, in addition to what he had previously done in the elementary school and in the Intermediate Training Squadron. The men are then ready for posting to operational squadrons.

This work in the Advanced Training Squadrons at the Flying Training Schools is a great benefit to the operational squadrons. Before this new system was introduced a pilot left a F.T.S. and joined, say, a bomber squadron when he could do little more than fly an aeroplane adequately. The squadron had to spend all the first months of the year in individual training of its new members, followed by flight training, and only towards midsummer was the squadron able to operate as a coherent unit. Now all that individual training is done in the A.T.S. and the pilot needs but little more detail instruction before he

The instructional staff at Hullavington. Left to right: Sgt. Flt. O'Keefe; Flt. Sgt. Boyd; Flt. Lt. G. J. Grindell; P/O. H. O. B. Maudslay; Flt. Lt. J. F. Hobler; Sqn. Ldr. A. P. Bett (Chief Flying Instructor); Flt. Lt. A. H. Button (Chief Ground Instructor); Flt. Lt. J. B. T. Whitehead; Flt. Lt. W. A. Richardson; Flt. Lt. F. W. Hilton; Flt. Sgt. Wallington; Flt. Lt. C. S. Byram (half hidden); Flt. Lt. S. H. Bell; Sgt. Howells; Sgt. Maun; Flt. Lt. N. W. D. Marwood-Elton; F/O. G. A. H. Kent.



Trainer Harts bear the brunt of most of the intermediate instruction. A refuelling scene on the tarmac.

can take up full work as a squadron officer. This is obviously a great economy of squadron time, and it means that if a surprise attack were launched on this country in the spring, it would not find our fighter and bomber squadrons unable to take the air as units to meet the emergency.

Of course, the F.T.S. cannot cover flying-boat work at all, beyond teaching the management of twin engines, or the specialised work of army co-operation. The pilots for those two branches have to go on the special courses at Calshot and Old Sarum, and torpedo work also has to be learnt in the T.B. squadrons. That is inevitable. But whereas the F.T.S. formerly turned out only a pilot, it now turns out a Service pilot, who has learnt that the R.A.F. means a great deal more than mere flying.

So far only the flying instruction at Hullavington has been described, but ground instruction goes on all through the course. A general idea may be given by stating the number of hours allotted to the various subjects during the whole course at No. 9 F.T.S. The education officer gives six hours' instruction, mostly in the first weeks of the course. This consists chiefly of mathematics, which the pupils will need in absorbing the other subjects. The armament officer has 45 hours at his disposal and the navigation officer 34. They arrange their times for lecturing with the Chief Ground Instructor. Signals occupy 30 hours, mostly taken up with buzzing. The pupils have been taught Morse at the civil elementary schools, and the standard of sending which is expected is eight words a minute. Drill is given 24 hours. Work on engines and airframes is taught by civilian instructors under the C.G.I., engines receiving 13 hours and airframes eight. Airmanship gets ten hours, administration and organisation eight, meteorology six, law and administration eight, and reconnaissance three.

In the intermediate term, as in the advanced term, there are three squads. One squad will do physical training from 07.30 to 08.00 hours; then breakfast, and lectures start at 09.00. Another squad on the same day falls in at 08.15 for colour-hoisting parade and drill till 09.00. The third squad is meanwhile flying. From 10.00 to 10.15 there is a break for all, and then the squads change over, No. 2 flying while Nos. 1 and 3 receive ground instruction. From 12.15 to 13.30 is the time for lunch. The afternoon work lasts from 13.30 to 16.30, and each afternoon (except Wednesdays and Saturdays) one squad spends the whole three hours flying, while the other two are instructed on the ground, changing subjects each hour. On Wednesday there are organised games, and everybody has to take some physical exercise, though the C.O. of Hullavington allows individuals to follow their own bent to a very reasonable extent. For instance, if a man's favourite game is golf he is not obliged to play some team game which may bore him stiff.

For the first three weeks of the course no leave is permitted, but after that each squad in turn may have week-end leave from Friday night to Sunday night. Pupils are allowed to dine out of mess once a week. An interesting rule is that permission must be obtained from the C.O. before a car may be kept at the station.

At the end of the intermediate term an examination is held, and each pupil must pass in his ground subjects before the C.F.I. will examine him for his wings. In four subjects, engines and airframes, drill, armament, and signals, the examinations are practical; in the others they are written. A pupil has to obtain 50 per cent. in each subject and 60 per cent. on the whole examination in order to pass. In the advanced term, ground instruction is carried on, but less time is given to it, for, as mentioned above, in that term two squads are always flying while only one is working under the C.G.I.

It is a strenuous course, strenuous for instructors as well as for pupils. Air Vice-Marshal Pattinson, A.O.C. No. 23 (Training) Group (which includes the 10 F.T. Schools), admitted in his lecture to the Royal United Service Institution that they would be glad when the expansion was over and they could take things a little more easily. But the results are excellent and the squadron leaders are more than satisfied with the pilots now turned out.

SAILPLANE CLOUD-FLYING

(Continued from page c.)

pendently of these sensations and in obedience to the visual information supplied by one's instruments. Unfortunately, this immunity rapidly diminishes; indeed, to preserve it at the highest level I should think a polishing-up lesson at least once a month would be desirable. This is clearly beyond the spare time or pocket of most amateurs, and so it comes down rather drearily to this—that the highest sailplane performances can be obtained with the greatest possible degree of safety only by professional pilots. The amateur's best course is to have a blind-flying course at the most likely time of the year for big cloud formations, and hope to strike lucky in his sailplane after.

A Link Trainer at the gliding club has been suggested, but apart from the expense, it seems likely that the Link does not produce, and so cannot cure, the true-blue sensations of vertigo.

If what I have written is taken as putting me into the don't-do-it class I would hastily correct that impression. I think the difficulties of this branch of sail-flying should make it all the more attractive to the true enthusiast, but the point one wants to drive home is that if these difficulties are not appreciated—they are even frequently denied—they become dangers. And one hates the aunts being right.

among them was the Blackburn Skua, the Westland Lysander, and the D.H. Albatross.

The building around which the day's party had really revolved is of particular interest, since it has been designed both for present convenience and future expansion. Working in collaboration with Mr. Whitney Straight, the architects—Robert Henning and Anthony M. Chitty—have managed to produce a plan which is easily adaptable to alterations without affecting the main structure.

In its preliminary state the building is a complete and pleasant architectural unit. The public section includes a snack bar and other facilities, while the club members have the use of squash courts and the usual drinking, lounging and dining quarters. The way in which the latter were used on Saturday to provide space for a very large number of guests gave a slight idea of the general adaptability of the building.

Among the firms (apart from the general contractors, Sadler and Sons) who have shared in the work at the new Ipswich aerodrome buildings are: Boulton and Paul (hangar); Coldair (refrigerators); Esse Cookers (kitchen equipment); Fison, Packard and Co. (bricks); William Freer (heating); Grampian (radio and public address equipment); T. Parsons and Co. and Walpamur (paint); Rowe Bros. (metal windows); and Viger Bros., Marbolith and Stonart (flooring).

This somewhat surrealistic impression at Ipswich suggests that the Albatross is trying to climb on to the airport roof to escape the militant attentions of the Sunderland and London (flying), Skua and Lysander.

FROM the CLUBS and SCHOOLS

LONDON

THE flying time for last week was 98 hr. 50 min. Mr. G. I. A. Spittle made his first solo flight, and five new members joined.

BOURNEMOUTH

The flying time for the fortnight ended July 10 was 38 hours. Three new members joined.

HAMPSHIRE

Owing to bad weather during the past fortnight only 89 hr. 30 min. were flown. Mr. J. A. Aris started his "A" licence course and Mr. J. A. Currie passed his "B" tests at Hendon.

BORDER

Extremely bad weather prevented much activity by members. However, the air services to the Isle of Man prevented the aerodrome at Carlisle from suffering stagnation.

YORKSHIRE

The flying time for the past week was 69 hours, making the total for the month 76 hours. The total would have been higher, of course, had it not been for the poor weather experienced.

READING

Very great relief is felt at the rescue of Miss Joan Parsons, after her forced landing in Tanganyika. Two flying members left last week—Mr. C. C. Cumings, who is returning to the Sudan, and Mr. M. R. Thomas, who is going to India.

CINQUE PORTS

The exceptionally bad weather restricted the flying time to 35 hours during the past week. Mr. F. J. O'Connor has completed his "B" licence night flying and Mr. H. D. Donkin made a successful first solo. Four new members joined.

HANWORTH

The total flying time for the week was 77 hr. 50 min. Messrs. J. D. Randall, A. T. Parris and Miss Ida Van Zanten obtained their "A" licences and Mr. K. Wyllie completed his first solo. There was one new member and Messrs. F. Segrera and R. C. Jude completed their "B" licence night flights.

ROMFORD

The Romford Flying Club has recently completed negotiations for use of a 100-acre landing field at Fairlop. This field has been licensed by the Air Ministry, and in future all pupils will receive instruction there. During this year, incidentally, the club machines have carried more than 1,700 joy-riders. Lady Londonderry and Lady Shelmerdine were among the spectators at the "all-women" air display last Saturday.

MARSHALL'S

During the week which ended on July 3, Messrs. Connor, Butcher and Reeves completed their "A" licence tests with Marshall's Flying School. Two pupils joined and the flying total was 40 hours.

Last week was a good one at Cambridge for early soloists. Two members, Messrs. Shortt and Darling, were sent off alone for the first time and the former, with Messrs. Humphrey and Butcher, qualified for their "A" licences. The flying total for the week was 60 hours.

BARTON (BEDS)

The Bedford School of Flying had quite a good week in spite of comparatively bad weather, and Mr. G. T. Perkins passed his "A" licence tests. The C. of A. overhaul on the Gipsy I Moth has now been completed.

C.A.S.C.

The Corps' first cross-Channel flight was made on Sunday, July 3. Six members in three machines flew from Cambridge to Le Touquet. A somewhat less ambitious flight was made by another member to Hatfield, and the flying time for this week-end amounted to 25 hr. 50 min.

High winds prevented the proposed trip to Barton and only 3 hr. 15 min. flying time was recorded last week-end. The next cross-Channel trip for members will be made on July 24.

SOUTH COAST

The pilot's height judging competition for a cup presented by Mrs. Beadle was won by Mr. A. G. Head; Mr. L. Gilson was second, and Miss A. Kelsey third. On Sunday, July 17, an arrival competition for aircraft from all flying clubs is being arranged; the sealed time will be between 12.45 and 1.25 p.m. and the first prize will be five guineas. On Monday of last week several machines flew to the British Empire Exhibition at Glasgow. Mr. L. Bellairs has presented a cup for competition—which will probably take the form of a cross-country handicap.

The Folkestone Trophy Race

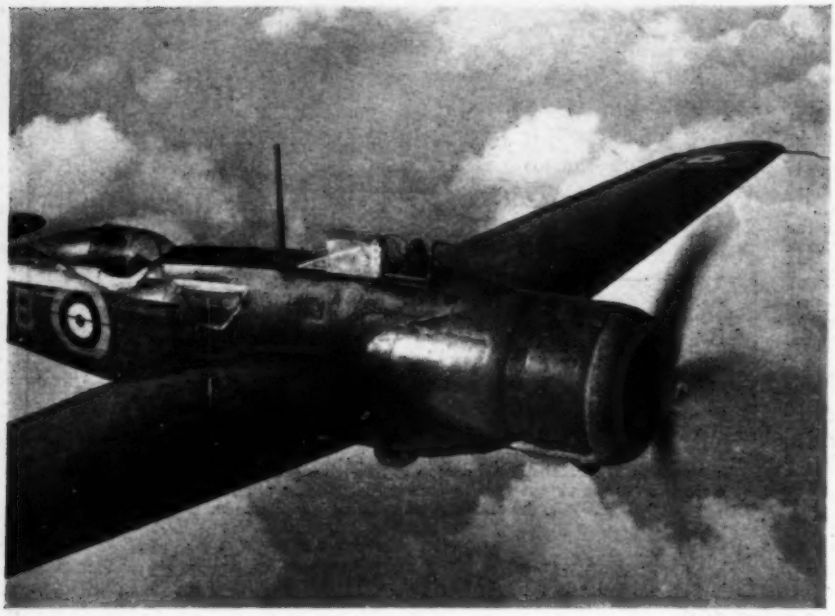
IT seems that quite a good entry can be expected for the Folkestone Aero Trophy Race, which will be flown from Lympne on Saturday, July 30. Among those who have already sent in their names are Mr. Alex Henshaw, who will fly his special King's Cup Mew Gull, and Mr. G. de Havilland, who will, of course, fly the reconditioned T.K.2.

The New Cubs

A FORTNIGHT ago Mr. A. J. Walter, the concessionaire for the American Piper Cub, reduced the British prices of these machines. The most expensive and well-equipped example, the J.3, is now sold for £475, while the J.2, which is similar but without special equipment and upholstery, can be purchased for a figure as low as £377. Recently the County Flying Club of Leicester has taken delivery of a third Cub for instructional flying at Rearsby.

Quite shortly Mr. Walter hopes to have one of the new 50 h.p. models over in this country for demonstration purposes. This machine can be fitted with the new Continental o.h.v. A-50 flat-four, the new Menasco flat-four or the three-cylinder radial Lenape Papoose, according to the wishes of the purchaser. Naturally enough, the Continental engine will be fitted to the demonstrator, since Mr. Walter is agent for this make of power unit.

LONG-RANGE FORMATION



"Flight" photograph.

Four Wellesleys of the Long-range Development Flight Fly 4,300 Miles

An aerial close-up of the Wellesley used by the Bristol Company for research. This is almost identical with the long-range machines.

THE longest non-stop flight ever made by a formation of aircraft was accomplished last Friday by four Vickers Wellesleys (Bristol Pegasus engine) of the Long-Range Development Flight.

Though the existence of the Flight and the nature of its equipment and objects had been known for some months, details of its first major trip had been kept secret (except for applications to fly over foreign territory) and the first news was in the form of an Air Ministry announcement signalling its success.

The four Wellesleys left Cranwell, Lincolnshire, at 4.15 last Thursday morning and took the Great Circle route to Ismailia, thence to Shaibah, Irak, and back to Ismailia, after travelling a comparatively short distance in a south-easterly direction from Shaibah. Their route took them over Belgium, Western Germany, North-Eastern Italy, Yugoslavia, Albania, Greece and the Mediterranean. The total time spent in the air was about 32 hours and the average ground speed was 135 m.p.h. Weather seems to have been good, as forecast, and the machines flew at an average height of 10,000ft.

The Wellesleys will remain in Ismailia for a few weeks before returning to England. Later in the year they will possibly attempt a non-stop flight from Egypt to Australia.

The flight was commanded by Sqn. Ldr. R. Kellett and each machine had a crew of three, each member being a qualified pilot and taking turns at the controls. Organisation was under the direction of Wing Cdr. O. R. Gayford, who is in command of the Long-Range Flight and who, in company with Flt. Lt. Nicholetts, flew from Cranwell to Walvis Bay, South Africa (5,309 miles), in 57 hours. This latter figure stood as the world's record for distance in a straight line until August 7, 1933.

The Wellesleys used for the flight are essentially similar to the general-purpose machines now in use in the R.A.F. The engines are specially tuned Pegasus XXIIs with Rotol hydraulic-type constant-speed airscrews. The noses of the machines have been modified to suit the latest Bristol long-chord cowling with controllable gills. Wellesleys in service are fitted as standard with short-chord cowling. The cooling characteristics of the installation were planned to cover the extremes of working conditions to be expected on long-distance flights overseas, *i.e.*, high air temperatures and low air density on the one hand and low power operation in a cold atmosphere on the other.

The Wellesley is, of course, built on the Vickers-Wallis geodetic principle, which gives an extraordinary good ratio of gross to tare weight. As a crew of three was carried in each machine, fuel tanks probably occupied most of the wings. The normal all-up weight of the Service-type Wellesley is 10,900 lb.

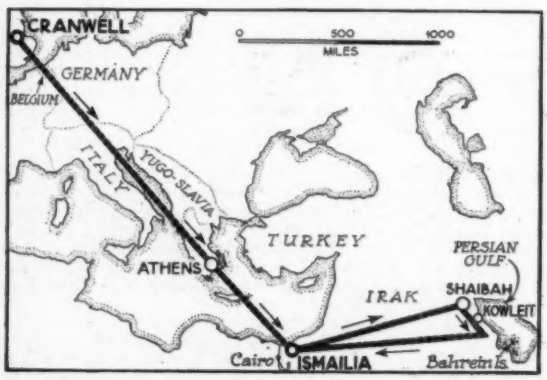
Crews of the four machines were as follows, pilot, navigator and radio operator being given in that order in each case:—

L.2638.—Sqn. Ldr. R. Kellett, Flt. Lt. R. T. Gething, P/O. M. L. Gaine.

L.2639.—Flt. Lt. H. A. V. Hogan, F/O. R. G. Musson, Flt. Sgt. T. D. Dixon.

L.2680.—Flt. Lt. A. N. Combe, Flt. Lt. B. K. Burnett, Sgt. H. B. Gray.

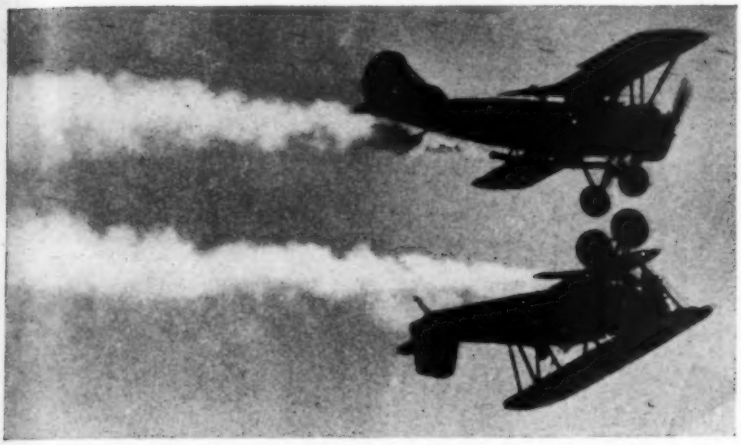
L.2681.—Flt. Lt. P. H. Dunn, Flt. Lt. A. T. D. Sanders, Sgt. B. N. Phillips.



A sketch-map showing the route taken by the four Wellesleys. (Right) Ministering to the Pegasus in the experimental Wellesley at Filton. The clean design of the Rotol airscrew is apparent.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



EXPERT IDIOCY (positively no deception) : **Frank Clarke and Paul Mantz treat the Cleveland crowds to something new in sensations, flying undercarriage to undercarriage and tracing their track with smoke. Mantz's machine (the lower one) is a converted Boeing "one-place pursuit ship."**

FOR the Deauville Rally this week-end no fewer than 70 British private aircraft, carrying 130 participants, have been entered.

The little Arado 79 illustrated in *Flight* last week has now captured another light plane record, covering 621 miles at 135.8 m.p.h.

Col. W. R. Styles has been appointed Midland area organiser for the Air Defence Cadet Corps. Intending recruits (14-18 years of age) should apply to him at Yelvertoft Manor, Rugby.

Intending A.D.C.C. recruits in the Watford (Herts) district should apply to P/O R. Kilby, "Kytes," Garston; those in the Hendon area may obtain details from Flt. Lt. Turner, Station H.Q., R.A.F., Hendon.

Brig.-Gen. J. H. W. Becke, C.M.G., D.S.O., A.F.C., has been appointed A.D.C.C. organiser for the whole of Scotland, and those wishing to join should write to him at Priestown, Edzell, Angus.

Miss Joan Parsons, who made a forced landing 200 miles north of M'Beya (Tanganyika) while on a London-Cape flight, was found unhurt last Friday after a four-day search.

The Junkers machine attached to the Nanga Parbat expedition last Wednesday week made its first flight to the mountain. Ten loads and a mail bag were dropped at one camp, after which the machine climbed to 25,000ft. to reconnoitre the proposed site of another camp which the expedition is to establish.

Mr. Howard Hughes and four companions left Floyd Bennett airport, New York, at 11.20 (G.M.T.) on Sunday and landed at Le Bourget 16 hr. 35 min. later (223 m.p.h.). They are attempting a round-the-world flight; their machine is a Lockheed 14.

The Trustees of the Busk Studentship in Aeronautics, founded in memory of Edward Teshmaker Busk, who lost his life in 1914 while flying an experimental aeroplane, have awarded the studentship for year 1938-9 to G. O. Jones, B.A., Emmanuel College, Cambridge.

American and British interests are reported to be negotiating with the Australian Government with the view to establishing the manufacture in Australia of commercial and military aircraft. North American machines are already being built under licence.

Hush! We learn from a recent newsreel that the R.A.F. has a new fighter called the "Vickers Viper." The film showed that it has a Pobjoy engine, monocoque fuselage, fixed undercarriage and dual controls. Such an odd resemblance to the C.L.W. Curlew trainer. . .

The following particulars of the Northrop monoplane used by the Bristol Company as a flying test bed for the Hercules are given in *The Aircraft Year Book*: Model, 2L; wing area, 363 sq. ft.; gross weight, 8,315lb.; top speed, 270 m.p.h.; cruising speed, 230 m.p.h.

GOSPORT, 1918 : A snapshot that is of special interest in view of the Gosport School reunion, reported on page 44. It was taken by the station's late medical officer.

Forthcoming Events

July 9-17. National Gliding Contests, Dunstable.
July 15. Isle of Wight Flying Club: Rally and Gymkhana, Lea Airport.
July 16-18. Deauville Rally.
July 16. Official opening of Luton Municipal Aerodrome by Secretary of State for Air.
July 17-24. Third Littorio Rally, Italy.
July 23. County Flying Club: Flying Meeting at Rearsby, Leicester.
July 29-August 1. Courtrai Rally, Belgium.
July 30. Official opening of Exeter Airport by Secretary of State for Air.
July 30. Folkestone Aero Trophy Race, Lympne.
August 20. Eastbourne Flying Club: Garden Party and Opening of New Club-house.
August 27-28. Southend Flying Club: Flying Meeting.
September 3. Cinque Ports Wakefield Cup Race, Lympne.
September 10. Cardiff Aeroplane Club: London-Cardiff Race.
September 11-18. Swedish Civl Aviation Week, Stockholm.
September 21. Aero Golfing Society: Celion Trophy, Richmond Golf Club.
November 18-December 4. Paris Aero Show.

"Flight" photograph

Some of the original members of the Gosport School of Special Flying gathered for the Brooklands re-union last Saturday. In the centre, distinguished by a beard and a glass of milk, is Col. R. R. Smith-Barry, founder of the Gosport school in 1917. On the left, in front of Air Comdre. Pulford, is Capt. Duncan Davis, who was host of the party, and beyond him, all but hidden, is the new Director of Technical Development, Air Comdre. Roderic Hill.

GOSPORT RE-UNION

BEHIND the history of the first Brooklands "Gosport Reunion" last Saturday lies a story of some interest. When, in 1917, the School of Special Flying was formed at Fort Grange Aerodrome, Gosport, the moving spirit behind the organisation was Colonel R. R. Smith-Barry, A.F.C.

When the School commenced operations, one of the first officers to take the course and be graded "A1 at Gosport" was Capt. H. Duncan Davis, A.F.C , who, after having received this category, was appointed Wing Examining Officer to the 34th Wing, R.F.C.

A third personality comes into the narrative in the person of a boy of some sixteen years who was at school in Southsea. In the Christmas Holidays of 1917 he and a number of other school O.T.C. members spent their leave in the "Headquarters Flight," where they helped (or, very possibly, hindered) with the repair of machines which had met with mishaps. His name was C. Nepean Bishop, and he is now a member of the Brooklands Flying Club, the managing director of which is, of course, Capt. Davis. Col. Smith-Barry is a private-owner member of the same club.

The idea of having a reunion at Brooklands came to Mr. Bishop some two months back, when it occurred to him that it would be twenty-one years in July since the School first started. That being so, it followed that the British flying training system of to-day came of age in July also.

And so the reunion came to pass. Enthusiastically aided by Col. Smith-Barry, Capt. Davis managed to trace a number of the old Gosportians, and on Saturday last they foregathered at the Brooklands Flying Club premises. There were 24 "veterans" present.

Before dinner, Colonel Smith-Barry persuaded Major Cloute into his—the Colonel's—Puss Moth and proceeded to show that his hand had lost none of its cunning. This flight was one of the higher spots of the evening, the Puss Moth assuming at intervals some incredible positions. Next Mr. S. Milner Deighton, who had not flown for some 20 years, was "ordered" into the front seat, whilst the Colonel sat in the back—with the dual control in. And Deighton flew it as if he had only been out of the air a few weeks—except for his turns, in which he skidded outwards. Asking, as he would of old, what he was doing wrong, as there was such a rush of wind on his cheek, Mr. Deighton was mildly surprised when told to "Shut the —— window"!

Dinner was then served in the Club restaurant, which had been made up as far as possible to represent the old Fort Grange Mess. After Colonel Smith-Barry, who was in the chair, had given the toast of The King, Capt. Duncan Davis said how honoured he was, as one of the earliest S.S.F. pupils, to have been successful in organising this reunion at Brooklands. He remarked that the success of the Gosport system was due to the foresight of Col. Smith-Barry, Col. Phillipi, Mr. O. W. E. Manning and others, and pointed out that the present Central Flying School method differed very little from that prepared by Col. Smith-Barry in 1917. He said that at that time it was his own ambition to run a "civil Gosport," and in 1927—ten years after—he got his chance and started the Brooklands School of Flying.

12,000 Miles to a Party

Maj. Norman Brearley, D.S.O., who commanded B Flight, said that he thought that this 21st anniversary meeting should not be allowed to pass without someone telling the assembled guests precisely how the School of Special Flying came into being. He had come some 12,000 miles to attend the party; he would like to hear about the commencement of the Gosport School.

Capt. S. Milner Deighton, Commander of A Flight in 1918, recalled how he used to quail at the fierce look in "S.B.'s" eye—a look which he noticed could still be produced if required.

Colonel G. Phillipi talked of the fights with the "powers that were" over the starting of the Gosport School. He had jumped at the chance of becoming an instructor, and was proud that his first pupil had been Capt. Williams, later Commander of C Flight. Six months after the start, all his pupils flew much better than he did, and he well remembered the occasion when Sir John Salmond came down, a fortnight after the school started, and saw 12 *ab initio* pupils fly in formation, loop, spin and land intact, after only 14 days' tuition!

Speaking of to-day's methods in the R.A.F., Col. Phillipi said there were far too many restrictions. These destroyed initiative in pilots, and he thought that if many of them were removed we should have an even better R.A.F.

Colonel Smith-Barry endorsed Col. Phillipi's remarks, recalling the help which he had from Sir John Salmond, who enabled him to get the pick of pilots posted back from France to start the school. He himself had actually done a year's instruction after a crash in 1914, after which he was given command of No. 60 Squadron overseas. It was then he found how badly trained were the pilots sent to France, and he voiced his opinion so loudly and long that he was at length allowed to start the school. He disclaimed being really responsible for the present system, saying that he had only done the "donkey-work." In other words, he had written the alphabet, whilst others had produced the classical works. His system was based on as few rules as possible. For instance, if there was a post on the edge of the aerodrome it was no use making a rule that it must be avoided when taking off or landing. It naturally would be.

Capt. F. P. Scott told how he took the system to Chile, whilst Wing Cdr. Pulford said that the present R.A.F.V.R. training sequence was essentially "Gosport," and other speakers were Mr. F. Dudley Hobbs, author of *How to fly and instruct on an Avro*, Capt. J. N. Dundas Heenan and Mr. C. G. Grey.

Mr. B. S. Smallman, secretary of the Brooklands Flying Club then presented Colonel Smith-Barry with a model of Clerget-Avro B.3157. This was the first machine that "S. B." and Capt. Heenan converted to take the Clerget engine in place of the Monosoupape Gnome, and in 1917 it caused something of a sensation.

Among those present at the reunion were :—

Air Comdre. Pulford, Maj. Norman Brearley, E. E. Stammers, Sgt. Wilmot (who was Col. Smith-Barry's personal mechanic), F. Dudley Hobbs, Col. G. Phillipi, R. H. Upson, Capt. D. Ayre, Rodwell Banks, O. W. A. Manning, Wing Cdr. H. A. Hamersley, T. Westbrook, Capt. F. P. Scott, Wing Cdr. Vincent, Capt. J. N. Dundas Heenan, R. E. H. Heenan, Flt. Sgt. Marwick, Air Comdre Roderic Hill, Maj. Gilchrist, S. P. Bousfield, Capt. D. Milner Deighton, Maj. Cloute, and, of course, Col. Smith-Barry and Capt. Duncan Davis.

COMMERCIAL AVIATION

THE WEEK AT CROYDON

"A. Viator's" Causerie on Airline Affairs at London's Main Terminal and Elsewhere

THEY are opening a new airport at a town not so far from London. It's the sort of place which, with the right facilities, we want as an alternative airport to Croydon when QBI is in force. Journalists, however, in rose-coloured spectacles, are writing the good old stuff we have heard so often about this new airport signing the death warrant or sounding the death-knell of Croydon.

Their main argument seems to be that the new place is only thirty-five minutes by train from London, but they don't mean the airport itself, you will find, but the town railway station, which itself will prove to be a longish five minutes from the airport. Now that is a state of affairs which exists at Croydon Airport, too, with Waddon station only five minutes away and quite good and quite frequent trains to London—probably better and more frequent than from the new place.

Why don't we all use Waddon? Simply because, as Mrs. Beeton might say if she worked at an airport, "First catch your train"—which is not so simple with long-distance connections, and the fact that you may be held off in QBI for as long as half an hour beyond your scheduled arrival time. Moreover, when you sort it out, you find that to load twenty to forty passengers and their luggage on to a road vehicle, unload them again five minutes later at a railway station, is not so funny, especially when time hardly allows you to get the whole lot into an impatient train.

There is a good deal of extra discomfort for passengers in all this chopping and changing, and no doubt worried foreigners would inadvertently embark themselves for dolorous destinations (from which there is no return), such as Peawhistle-Parva, Upper Gumtree, or Wallop-on-the-Brow.

In the end, unless the railway station is actually *on* the airport and unless there are really fast trains at least every ten minutes, it is a longer as well as a more difficult process to get your passengers to their destination by air-cum-road-plus-rail than by air-cum-road.

The first maxim of air travel is that ground transport must wait on air transport, and the second maxim is that it is better to keep on moving steadily, if comparatively slowly, by coach from airport to town than to move in a series of fits and starts, with confusion-filled pauses between, in order to try to save five minutes.

Customs and Customs

Quaint freights we get by air sometimes. A bunch of scratchy things in a packing case consigned from Berlin to the Zoo, via Imperial Airways' import department, were luckily not opened and examined by Customs, for they proved to be scorpions. Then there was a consignment of big, fat blood-worms from Belgium, presumably for fishing. Maybe there's a political crisis coming, and they are for the Prime Minister. Then there was a most intriguing assortment of primitive navigation instruments such as the pioneer explorers used, which were brought in from Paris for some London museum by Air France. They were the sort of astrolabes and what not that steered the Armada, yet Customs, with paralysing solemnity, required written statements that they were over a hundred years old—suspicious, no doubt, that they might be fitted to some long-distance aeroplane.

Queer coves, Customs, with customs all their own. You must not, for example, import counterfeit coin of the realm, whatever the coins are made of. On this regulation I have known chocolate coins, covered with gold foil, to be refused entry to this country. Fact, I assure you.

"Airmen," says a newspaper, "have been specially transferred from the German Air Force to the ranks of civil pilots so that they can learn night flying over England. No restrictions are placed on German pilots flying at night between England and Germany, yet British pilots are not permitted to go at night beyond Cologne."

Now that is so splendidly inaccurate, both in fact and inference, that I am tempted to tell one just as fantastic. It is not generally known that the International Spy Club has arranged a quota system between various countries. Practically every night-flying machine arriving at Croydon has amongst its passengers a number of thinly disguised air aces of Foreign Powers. If a Father Christmas false beard dangles by one ear, or if it manifestly clashes with raven locks, officials carefully selected for partial blindness scrutinise the traveller through their blind eye and are deaf to the clank of a sword half concealed beneath a gent's civilian overcoat.

From this side streams of prominent military folk depart for all the capitals of Europe by air. Usually they have been treated with a dark oak varnish topped off with a pink or blue turban, and they register at foreign hotels as H.E. the Jam of Plummanapple or H.H. the Napoo of Nerts. This formality having been achieved, they usually go out and see life with the local Secret Police.

As a matter of fact, most airline pilots of most nationalities are Air Force Reserve officers, anyway, and it is not long since it was announced that R.A.F. officers would be seconded to Imperials and British Airways to teach them air-route flying. It is nonsense to say that British pilots may not fly farther than Cologne at night. British Airways fly regularly to Berlin and get the fullest assistance, in so doing, from the German authorities and D.L.H.

Those who set up to safeguard the freedom of the Press in this country should also see to it that this freedom is not grossly abused by ill-informed and harmful articles, as inaccurate as they are wantonly sensational.

K.L.M. in the North

The K.L.M. North of England line, Liverpool-Manchester-Amsterdam and beyond, is doing well this year, I hear, thanks, partly no doubt, to the new Ringway Airport which really brings the Manchester business man into the picture as an air traveller. An innovation up there for golfers is the free carriage of clubs and bags, provided that they do not weigh more than 20 kg. This has been arranged in conjunction with hotel people at Nordwyk.

A week or two ago I gave, in all innocence, a daily mileage for British Airways of 3,918. As a matter of fact, British Airways does no less than 5,179 miles daily, what with six return trips every week-day London Paris, one London-Stockholm return trip each week-day, and a London-Berlin single journey every week-day.

Tests are being made, according to a Sunday paper, with material of a glass-like nature for an almost invisible aeroplane. When the R.A.F. get these things, civil pilots are urged to keep hundreds of miles away from Biggin Hill and other Service aerodromes. It is bad enough having visible stuff swooping at you from behind clouds, but what will give you the tremolo-jitters will be the sight of an officer in a sitting position, with no visible means of support, flashing past you at 200 m.p.h. at ten thousand feet.

Too bad that they cannot make pilots invisible as well, but I do hear that they will dress R.A.F. people in cellophane suits and have them tattooed all over with fleecy clouds on a bright blue background.

Edinburgh's Aerodrome

MACMERRY, the Edinburgh Flying Club's aerodrome, which is situated twelve miles from the city, has been approved by the Air Ministry as a standard civil airport. Extensions to the landing area are now contemplated, and, arrangements having been made for an R.A.F. Station at Drem, the proposed site for a civil aerodrome at Gosford will be ruled out.

COMMERCIAL AVIATION (CONTINUED) : WORLD NEWS

Hamburger Landplanes

THE Hamburger Flugzeugbau is constructing two landplane freighters which are designated Ha.142. They are developed from the Ha.139 floatplanes as operated by Lufthansa, but instead of being powered with Junkers diesel engines they have 800 h.p. radial petrol engines. The disposable load of the new type is 1,320 lb. more than that of the seaplane, and the calculated cruising speed is 218 m.p.h. instead of 162 m.p.h. Dimensions are: span, 96.7ft.; length, 53.9ft.; Wing area, 1,399 sq. ft.; and gross weight, 34,540 lb.

The New Shorts

CONFIRMATION of the report that the new Short super flying boats will have sleeve-valve Hercules engines is given in the Report on Civil Aviation for 1937. Their all-up weight will, it is stated, be "three-quarters as much again as the Empire flying boats," the figure for which is 40,500 lb. The new boats will be able to carry passengers across the Atlantic without resort to either assisted take-off or refuelling in the air. Reference is also made in the Report to the eight strengthened Empire boats which will fly at more than their maximum take-off weight by virtue of aerial fuelling.

Luton's Airport

ONE or two additions have been made to the programme for the official opening of Luton Airport on Saturday. A British Airways Electra and the three Mew Gulls which flew in the King's Cup race will, for instance, be on parade, and Capt. Percival will make the first Customs clearance before flying the Q.6 to Deauville for the Rally there. There will be a humorous item, details of which are not divulged, and if the Mayo composite gives its demonstration it will arrive at about 5 p.m.

Pilots entering the arrivals competition should land between 11.30 a.m. and noon.

Two New Aerodromes

WEST HARTLEPOOL'S aerodrome, the site of which is about three miles from the centre of the town and adjoining the village of Greatham, will be officially opened on September 19. In the meantime the Council do not propose to erect any buildings of their own, but work is proceeding on a Volunteer Reserve centre which will be in use soon after the opening.

The initial scheme for the aerodrome involves runs of 980-1,100 yards, and when an additional 43 acres has been incorporated there will be a bad-weather runway of 1,300 yards. The inspection of possible sites began as long ago as 1930, but the land was not actually bought until April of last year.

At about the same time Burnaston aerodrome, Derby's Municipal effort, will also be opened. The site of this lies approximately midway between Derby and Burton-on-Trent.

Mission in Montevideo

ALTHOUGH the liner on which the members were travelling was only in port for seven hours, the British Airways mission to South America managed, with the help of the British Minister, to do some good work in Montevideo. The party first went out to Melilla Aerodrome, where the Pluna D.H.86B was chartered for a flight along the Uruguyan coastline and over neighbouring aerodromes. Afterwards they left for the Department of Civil Aviation, where weather statistics were studied. The mission is now in Buenos Aires, where discussions are in progress with the Argentine authorities.

This is only one of many occasions when Mr. E. Millington Drake, C.M.G., the British Minister in Montevideo, has been of considerable assistance in such matters—ensuring that private British interests have been able to compete with official invitations from other foreign Governments. Not very long ago, when the Marquez Vaeza brothers were considering the formation of the first local air line, the Minister, quite privately and at his own expense, sent one of the brothers to England in order to make a study of our air line operations. At the same time he sent an engineer to study methods at Hatfield, a pilot to take a blind-flying course at D.H. school, and an official of the Uruguyan Navy to study meteorological methods.

S.A.B.E.N.A's New Fleet

THE Savoia Marchetti S.83 tri-motor low-wing monoplane which will make the Brussels-Belgian Congo trip in twenty-four hours is fitted with Wright G2 cyclone engines of 850 h.p. each. The weight empty is 15,320 lb., and the all-up weight is 24,580 lb. A crew of four is carried, and there are seats for ten passengers. The top speed is given as 268 m.p.h., and the machine will cruise comfortably at 235 m.p.h. The range with full load is given as 1,350 miles.

Atlantic Clipper Modifications

FOLLOWING initial tests with the 74-passenger Boeing 314 Atlantic Clipper, which made its first flight on June 7, it has been decided to fit twin rudders to facilitate manœuvring on the water at slow speeds. Further alterations will be made to the angle and span of the seawings to provide additional lateral stability on the water. Judging from photographs which we have seen of the initial handling tests, both modifications would appear to be rather necessary. By eye alone, the single rudder *did* look on the small side.

Another British Airways Appointment

MR. ROBERT MAXWELL, who has been connected with the transport industry at home and abroad during the last fourteen years, has been appointed Commercial Manager to British Airways.

Between 1932 and 1934 Mr. Maxwell was at Brough with the North Sea Aerial General Transport Company, and thereafter, until 1936, when he joined Misr-Airwork in Cairo as controller of operations, he was general manager of Indian National Airways.

The Australian Extension

AFTER a certain amount of trouble at Darwin and elsewhere, the Short boat *Challenger*, which inaugurated the through flying-boat service to Australia, reached Sydney on July 6.

At Darwin the passengers had to wait for some time before being disembarked at dusk on July 3, and after being taken ashore in two small launches there was a further long wait before Customs formalities could be completed. The fact that the preparations at Darwin were inadequate has caused a storm of protest in various circles in Australia, and the Minister of Defence has demanded a report from the Port Darwin authorities. The effect was all the more marked because the outward-bound K.N.I.L.M. Lockheed 14, when arriving at Darwin aerodrome on the following day, was officially welcomed and the entire Customs procedure was completed in half an hour.

After *Challenger* had put down in the choppy sea at Port Darwin a refuelling launch broke from her moorings and slightly damaged a wing-tip float. On the following morning it was found that the battery charge was insufficient to start all four engines, and there was an hour and a half's delay before new batteries could be obtained from the aerodrome.

However, Capt. G. U. Allan, of Qantas, who was in charge of the boat, managed, by careful adjustment of his height to suit the weather conditions, to make up quite a lot of time on the 1,200-mile run between Darwin and Townsville, a run which included halts at Groote Island and Karumba. At Karumba, on the eastern coast of the Gulf of Carpentaria, another refuelling launch dented the starboard float, so that both were aerodynamically balanced. On reaching Townsville the boat was moored and the passengers landed in a matter of fifteen minutes, which to some extent made up for the Darwin affair.

Meanwhile, the first homeward machine had left Sydney on July 5, and the K.N.I.L.M. Lockheed duly arrived on the same day from Batavia on the inaugural flight of the Dutch through-service to Australia.

The first Imperial Airways through-service to Australia took, in all, a little over ten days, which is a day longer than the scheduled time. The service was run to some extent in relays, *Cordelia* and *Camilla* leaving Southampton on June 25, the latter's place being taken by *Challenger* at Calcutta and the former finishing its journey at Singapore, while *Challenger* went on to Sydney. In future an additional service will be run to Australia, so that Imperial Airways will have eight services flying to Egypt, five to India, three to Malaya and three to Australia, while on the African route there are already three services weekly to Central Africa and two to Durban.

"Flight" photograph.

An early application of the Diesel to commercial aircraft was in the vast Junkers G.38, which had four of the 600/750 h.p. Jumo 204 type units. More recent machines with the faster-running Jumo 205 engines have been illustrated several times in *Flight* during the last year or two in connection with Germany's Atlantic services.

THE DIESEL in SERVICE

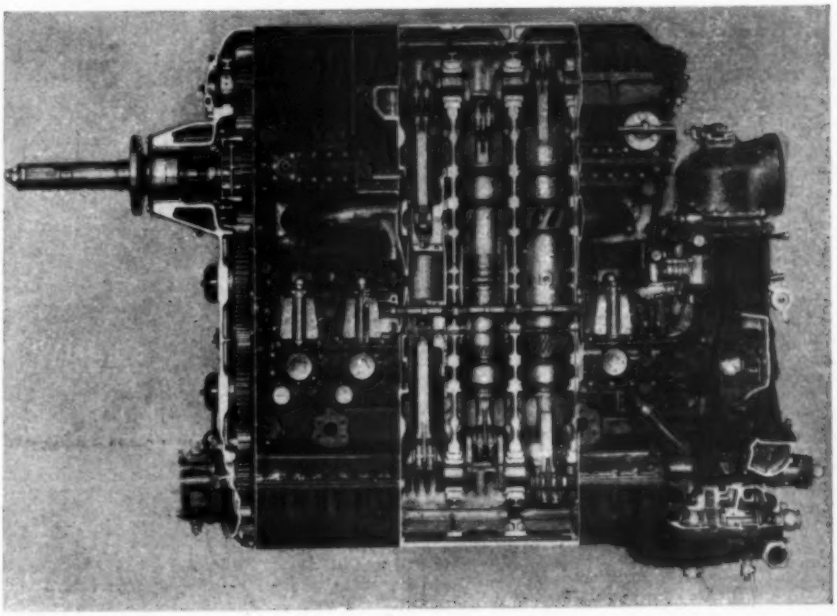
Deutsche Luft Hansa's Experience with Junkers Heavy-oil Engines : Points from a Lecture Delivered by Dr. Stüssel, of D.L.H., before the I.A.T.A.

THE reasons for the fact that D.L.H. have long supported and assisted in development work with the compression-ignition type of engine are not difficult to see. Not only have suitable engines been developed in Germany, but the company has always been interested in the type of long-distance service for which the diesel engine is particularly suited. Furthermore, the question of fuel price was an important one, and D.L.H. were naturally interested, too, in the reduction of the fire risk.

The work of both the Dornier Do.18 and the Blohm and Voss Ha.139 floatplane over the North Atlantic is too well known to require extensive comment, but it is interesting in the latter case to realise that, though an increase of 20 per cent. in the weight of the engines involves a reduction of only 880 lb. (7 per cent.) in the fuel load carried for the same gross weight, the consumption of heavy-oil engines is 15-20 per cent. lower than that of equivalent petrol engines, and the initially greater weight is balanced after a few hours' flying. The machines used by D.L.H. over the North Atlantic have a safe range of 3,000 miles. The figure of 0.375 lb. per b.h.p./hr. has been actually obtained in service under all conditions and without any kind of complicated regulating mechanism. The claim so far as fire risk is concerned is that, though heavy oil *can* take fire, such fires do not break out so readily and are more easily extinguished.

Diesel engines for aircraft are still in a very early stage of development, and it was not until 1931, after preliminary trials by the Junkers Company, that D.L.H. put the first machine fitted with this type of engine into service. The engine was the Jumo 204 of 650 b.h.p., this output being later increased to 720 b.h.p. The primary trouble with this original engine was in the design of the pistons, since, in a two-stroke with direct injection, these components are severely stressed. It will be remembered that the inlet and exhaust ports are, in these engines, controlled by the pistons themselves. Junkers have had little difficulty with the fuel-injection pumps and nozzles.

Two years later the 205 type was developed, this running at the comparatively high speed of 2,100 r.p.m., and developing 550 b.h.p. Similar piston troubles were at first encountered, and effective protection from the high-combustion temperatures was obtained only by the expedient of fitting a heat-resisting plate over the crown of the light alloy piston, and a long series of trials was necessary before a reliable method of securing this plate could be found. The sealing action of the piston rings is aided by the fitting of an undivided gas-ring, which is, however, pressed against the cylinder walls both by the temperature and the pressure of the combustion gases. Some trouble was



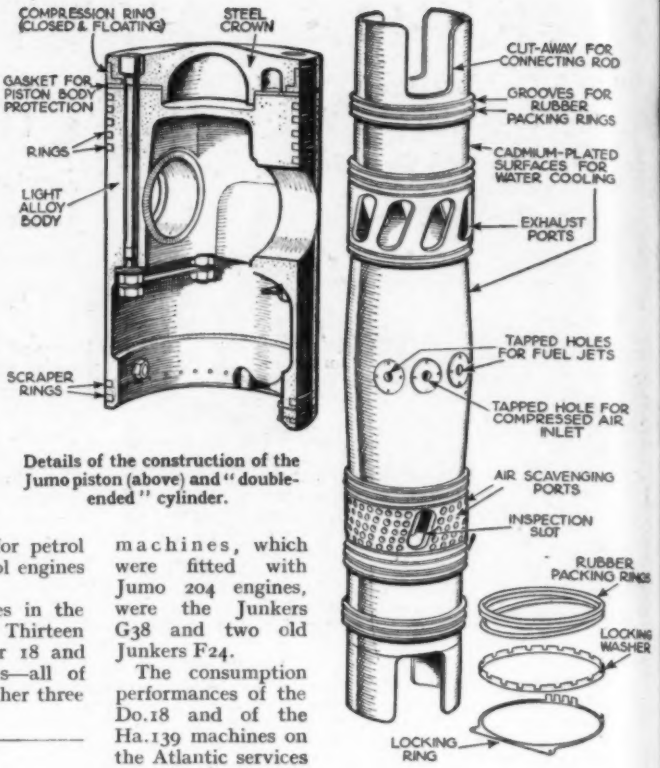
The 550/600 h.p. Jumo 205 compression-ignition two-stroke in part section, showing how each of the six cylinders carries two pistons, opposed head to head. Before the end of the outward power stroke one piston uncovers the exhaust ports and shortly afterwards the other uncovers the inlet ports, through which air is forced by a rotary blower. On the inward stroke the air is compressed and the oil fuel injected. The crankshaft gearing can also be seen.

experienced here, and it was not until methods were found of improving the cooling of the cylinder liner in the neighbourhood of the combustion chamber that the difficulties were reduced. Curiously enough, the bearings have always stood up extremely well, and the only troubles in this connection were due to the use of compressed air for starting purposes; electrically operated impulse starters are now used.

In 1936 the Jumo 205 was first put on to the work for which it was originally designed—that of long-stage ocean flying. In this and in the succeeding year the engine hours of the 205s in service increased more than fourfold, more than 15,000 hours being put in during 1937. In this year, too, the engine hours for the two types totalled 19,454, and, as there were 48 engines in active use, each engine was averaging more than 400 hours' flying.

For the present the total life of a diesel engine cannot be satisfactorily predicted. Those in service with the longest life have so far run for about 1,000 hours. Overhauls are carried out after every 250 hours—a figure which is naturally well below the normal one for petrol engines, though, to be fair, one should take petrol engines of ten years ago for comparison.

At the end of last year twenty-two machines in the D.L.H. fleet were fitted with heavy-oil engines. Thirteen of these were Junkers Ju.86, four were Dornier 18 and two were Blohm and Voss Ha.139 floatplanes—all of which were fitted with Jumo 205 engines. The other three machines, which were fitted with Jumo 204 engines, were the Junkers G38 and two old Junkers F24.



Details of the construction of the Jumo piston (above) and "double-ended" cylinder.

DORNIER Do.18.

Useful load (lb.).	Fuel (galls.).	Speed (m.p.h.).	Range (miles).
882	880	137	3,107
882	880	124	3,417
882	880	112	3,542
BLOHM and VOSS Ha.139.			
1,323	1,420	155	3,107
1,323	1,420	143	3,417
1,323	1,420	124	3,604

The consumption performances of the Do.18 and of the Ha.139 machines on the Atlantic services are given in tabular form in the adjacent column. The comparison is interesting.

In the case of the Dornier the figures are those obtained in practice, since this type had completed six crossings in 1936. The actual figures for consumption showed that, for speeds between 112 and 137 m.p.h., the fuel used by both engines together lay between 1.75 and 2.25 lb. per mile. With the Ha.139 cruising at 155 m.p.h., the consumption of all four engines has worked out at 3.87 lb. per mile in trial flights. Two machines of this type have, so far, made fourteen crossings of the North Atlantic.

Aircraft Production—A New Monthly Journal

ILIFFE AND SONS LTD. will shortly publish a new monthly journal devoted to the aircraft manufacturing industry. It will be entitled *Aircraft Production*.

Those who are acquainted with *The Automobile Engineer*, the technical monthly journal dealing with production and works equipment in the automobile industry, will feel confident that the new journal will be thoroughly reliable from the engineering standpoint, and will be informative, instructive and well presented

The contents will embrace works practice, airframe construction and assembly, instrument design and layout, aero engine manufacture, machine tool and general equipment, production of components (with special reference to light materials and alloys), as well as factory design and works organisation.

In this new technical journal the various processes of manufacture and the materials involved, together with their characteristics, will be described by experienced engineers, while works equipment and plant, such as conveyors, electrical gear, gauging and testing apparatus, lighting, air conditioning and all essentials of a modern factory will also be covered.

It will be essentially the journal for all directly and indirectly engaged in, or associated with, the many branches of aircraft production, and will appeal to works directors, designers, production engineers, managers of departments, section leaders, buyers, suppliers of materials, inspectors, and, in fact, all whose activities are connected mainly with the works side of aircraft production.

Efficient production of aircraft is the problem of the moment. The aim of the journal will be to promote efficiency in the aircraft industry as a whole by co-ordinating design and production and by disseminating the most modern ideas and methods in the repetition manufacture of aircraft.

Gliding Contests' Auspicious Start

THE National Gliding Contests, in which 29 sailplanes are competing at Dunstable this week, started auspiciously with an attempt on the world duration record for two-seater sailplanes, which stood at 21 hours 2 minutes, to the credit of Germany.

Flt. Lt. W. B. Murray and Mr. Stanley Sproule were winch-launched in the Falcon III two-seater at 04.09 hours on Saturday, with two air cushions, a suitcase of food, and two books.

The wind was good, but continual heavy rain showers made flying very unpleasant in the open machine, which had not even a windscreen.

In the evening they dropped a note saying they were hungry, so Flt. Lt. Shaw took up a G.B. sailplane with a packet containing food and an evening newspaper dangling on a length of string. He tried three times, but each time the two-seater's drag wires cut the string just out of reach, and the parcel was lost.

As it grew dark, hurricane lamps were lit along the edge of the hill, supplemented by rows of spectators' car lamps.

At 02.20 hours on Sunday morning, a signal was flashed to the sailplane that the record was beaten. At 02.22 hours it made a perfect landing by floodlight, having been in the air for 22 hours 13¾ minutes.

It was a really magnificent effort, in spite of the miserable weather, and the fact that one of the pilots had all but broken his leg two days before and felt very ill most of the morning.

The competitions last until next Sunday, by which time, it is expected that, weather conditions permitting, new distance and altitude records will have been established.

Arrangements have also been made abroad in case any pilots are able to soar across the Channel and land in France or Belgium.

MODELS

Wakefield Selection : Scale-model Performance : Tail-less Record : Airflow Study

By M. R. KNIGHT

In the heading picture is seen Mr. S. R. Crow's flying scale-model Leopard Moth.

Choosing the Wakefield Team

OVER 200 modellists competed for a place in the team which is to represent Great Britain in the contest for the Wakefield Cup, to be flown at Guyancourt, Paris, on July 31. Mr. E. Chasteneuf, of the Blackheath Model Flying Club, secured first place, and the F. R. Barnard Cup, with an average of 247.483 sec. on three rise-off-ground flights. He flew an improved version of the tapered shoulder-wing monoplane (with elliptical multi-stringer fuselage) with which he secured first place in last year's trials. He was also responsible for a flight of 8 min. 35 sec., the best effort of the day.

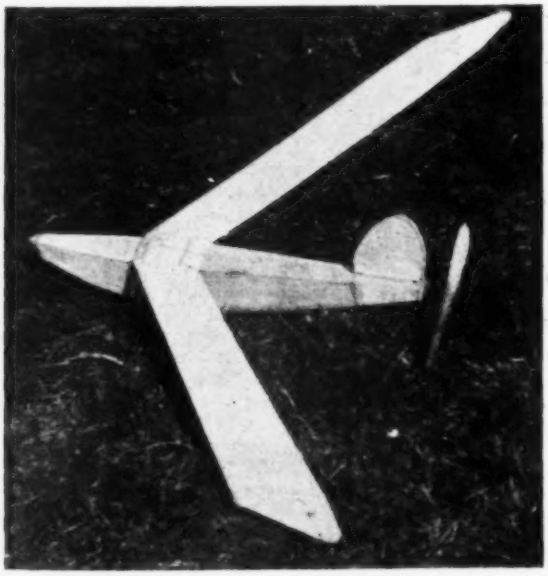
With a somewhat similar machine, Mr. R. N. Bullock (Blackheath M.F.C.) obtained second place by averaging 231 sec. An earlier version came second in the 1937 contest proper. Third and fourth places went to Messrs. F. J. Almond and R. Smith, of the North Kent M.A.S., who averaged respectively 190.6 sec. and 184 sec. with high-wing monoplanes having slightly backswept constant-chord wings and flat-sided fuselages. A constant-chord parasol with diamond-section fuselage, built by Mr. H. White (Luton D.M.A.C.), averaged 178.76 sec., and Mr. L. Stott (Halifax M.A.C.) scored 167.6 sec. with a shoulder-wing model having slightly tapered wings and elliptical multi-stringer fuselage. None of these models employed a geared motor.

Gala in a Gale

THE sixth annual gala meeting held at Fairey's Great West Aerodrome on June 19 might be described, in the words of a spectator, as the Northern Heights Club's *gale* day. Nevertheless, models, modellists and cars turned up in large numbers, and over 300 competitors participated in the nine contests which were successfully concluded. Only the contest for the Coronation Cup was postponed, the organisers not caring to ask owners of the "super-streamlined modern free-lance types" to risk them under such conditions. They included a twin-motor low-wing with very hush-hush airscrew-drive by Mr. C. Rupert Moore, and another twin-motor low-wing by Mr. H. E. White.

The *Flight* Challenge Trophy for flying scale models with wings in the true scale position was won by Mr. S. R. Crow (Blackheath M.F.C.). His fine Leopard Moth holds the hand-launched and rise-off-ground type records of 61.5 and 109.39 sec. The scale is 1in. to 1ft., and the only variations from the prototype are a slightly larger airscrew and 10 per cent. increase in tail area. A single skein of rubber is employed, and the total weight of the model is only 3¼oz. A photograph appears on this page. Second place went to Mr. R. T. S. Gillett (Park Model Aircraft League), who flew another fine Leopard Moth.

The herculean organising efforts of Mr. C. A. Rippon and the Northern Heights Club were deserving of better weather.



Mr. Howard Boys' successful tail-less model described on this page. The snapshot hardly does the machine justice.

Tail-less Record

THE tail-less record of 90 sec., established by Mr. F. B. Baggs in the dark ages of 1932 or 1933, has at last been broken. The figure was recently raised to 125.75 sec. by Mr. Howard Boys, of the Northants M.A.C., using a model with a tip-to-tip span of 50in., a constant-chord of 5in., and a total weight of 5¼ oz. The machine has been flown as a pusher and as a tractor, the former arrangement being employed in establishing the record.

There are 30 ribs in the wing, which is in two parts, and has an area of 240 sq. in. There is a slight dihedral angle, and a sweep-back of 36 deg. The section is Göttingen 436. The incidence decreases by 2 deg. in the first three-quarter span, and by a further 6 deg. at the tips. No separate controllers are fitted. A fin on the rear of the fuselage has since given place to wing-tip fins. The fuselage length is 28in. An airscrew 15in. in diameter and pitch is turned by 2 oz. of rubber arranged in a single skein of eight strands.

Observing the Airflow

"WITCH-DOCTORING" was the caustic term with which a scientifically minded enthusiast recently castigated the somewhat hit-or-miss design methods prevalent in model aeronautics. In defence, it may be pointed out, information on slow-speed aerodynamics was until recently almost entirely non-existent. Sundry modellists have now "gone all wind-tunnel," while very great interest has been aroused by a machine for the visual demonstration of low-speed aerodynamics, which has been introduced into this country from Germany (where it is in use throughout the aeronautical schools) by Mr. H. York, of Model Aircraft Supplies, Ltd.

By means of this apparatus the flow over discs, spheres, wing-profiles, and bodies of various shapes can be experimented with and clearly observed. The object selected is immersed in a special fluid, which is set in motion by a 220-volt screw-action turbine, and filtered into straight lines by honeycomb tubing before passing across a glass-fronted panel lit by diffused light. Particles of oak-dust are used to enable the flow to be observed at various angles of incidence. There is a device for varying the rate of flow from 12 to 20 m.p.h. scale speed.

A recent experiment indicated that a suitably shaped cabin will improve the airflow over the fuselage, while another idea is to use a sectional model of a particular flying-ground to ascertain the probable behaviour of air-currents. Model flying clubs are invited to arrange pilgrimages to this shrine of model aerodynamics.

NEW MACHINE TOOLS

BROACHING was at one time regarded as an inefficient method of cutting keyways and internal irregular contours that could not be machined by other methods. In modern practice, however, the advances made have led to the adoption of broaching, in some cases, in preference to shaping, milling, and even turning or grinding operations, on both internal and external work. A high degree of efficiency has been reached, but, apart from this, broaching has advantages not always obtainable by alternative methods of machining when it is desired to produce surfaces having a wear-resisting structure or skin. By a combination of cutting teeth followed by burnishing or planishing teeth, for example, the surface metal can be compressed after machining.

New possibilities are opened up in this field by the development of the works of Weatherley Oilgear, Ltd., Arch Street, London, S.E.1, for the manufacture in this country of a full range of high-output machines of a type previously only obtainable from the United States. Since the frames of these machines are of all-steel welded construction, they may readily be built to suit any particular requirements or capacity—an important point in the British market. Three main types of machines are built: the ordinary internal broaching machines using the broaches in tension, the push broaching and surface or external broaching machines, and the Cyclematic model, which is a fully automatic repetition machine.

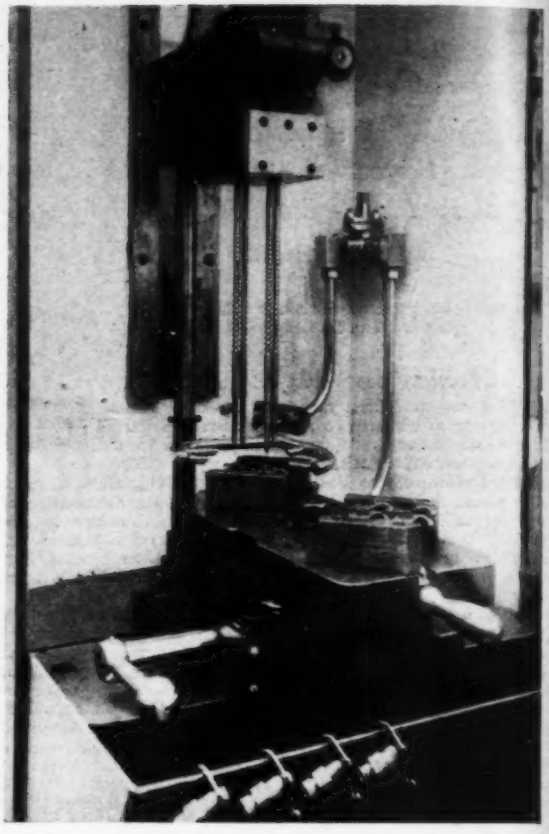
Push-broaching.

The inclusion of push-broaching machines is of interest, since this method of broaching has been pioneered by the Weatherley Company in the face of considerable opposition. Without entering the controversy as to the relative merits of operating a broach in tension or compression, it may be stated that push broaches have been adopted in preference to the older type by some of the leading automobile concerns on account of the increased convenience and simplicity in operation, whilst they have proved equally successful in the results obtained.

A machine arranged for multiple push broaching on a cam assembly is shown in the illustration. The work consists of broaching a 0.316in. diameter hole, and an output of 750 pieces per hour is maintained by using an indexing fixture for loading four pieces at each station. An interesting feature of this machine is a broach handling attachment (the design of Mr. H. E. Weatherley) mounted beneath the fixture and platen to provide an additional guide for the broaches and to obviate any handling of the tools by the operator. At the end of the downward cutting stroke this attachment releases the broaches from the ram and lowers them to clear the work and indexing fixture. In bringing the parts loaded in the opposite station into the operative position, a pause is made midway and a level on the side of the machine is operated to raise the broaches and recouple them to the ram, which then automatically returns with the broaches ready for the next cutting stroke.

In all external or surface broaching operations it is essential that the lateral stresses should be taken within the fixture in which the broach bar is rigidly guided. For economy in handling a variety of work, the latest practice therefore consists of employing a standard master broach bar, which may be of hardened steel so that the broaches may be mounted on auxiliary broach bars housed in the master bar. A particularly useful application of external broaching is in the finishing of connecting-rod big ends, since the entire profile of the bolt bosses, bearing seat and joint faces can be broached. It is also possible to broach the big-end oval and to sever the cap by broaches so as to form a round bore with the assembled parts.

The Oilgear pumps employed in these machines are of special design to provide a variable delivery of pressure oil free from pulsations. These pumps are also being incorporated in special triple-acting presses designed for combined drawing, embossing and forming operations on large pressings for aircraft work.



With the aid of an indexing fixture loading four pieces at each station, this Weatherley multiple push-broaching machine deals with 750 pieces per hour.

Lions and Lambs

ANYONE who has formed the idea that the British aircraft industry is perpetually at war with the Air Ministry would have changed his views had he been present at the cocktail party which Mrs. F. Handley Page gave at her house at Stanmore on Tuesday of last week. Numerous representatives of the Air Ministry, the R.A.F., and the aircraft industry were present, as well as a number of foreign air attachés, and the spirit of cameraderie which prevailed at Elms House must have given the attachés food for serious thought.

A Pioneer Passes

FLIGHT records with very sincere regret the death, at Karlsbad, of Hellmuth Hirth, where he was convalescing. Some years ago Herr Hirth inadvertently walked into a revolving airscrew and sustained severe injuries. He had been considered recovered from the mishap, but his recent illness was probably connected with the old injuries, and on July 1 he passed away suddenly.

Hellmuth Hirth was one of Germany's pioneer pilots and was contemporary with such other famous names as Robert Thelen and Roland Garros. In about 1913 or so Hirth published a very interesting book on his flying experiences, and later he visited Hendon, where, one recalls, the great German pilot Hirth and the equally great French pilot Roland Garros, who were close personal friends, were seen walking about with their arms around one another's shoulders. A few months later they were at war.

Some years after the war Hirth established an aero engine factory at Stuttgart, where he produced some very good engines. A particular feature of these was the shock-damped crankshaft, which was patented by Hirth's father. Hellmuth Hirth's brother, Wolfgang Hirth, is known in this country mainly through his work in connection with gliding.

With the death of Hirth has been severed one more link with the "heroic" days of flying. His death will be mourned not only in Germany but throughout Europe.

The Oxford's Equipment

IN connection with the recent description of the Airspeed Oxford it should be added that, like the undercarriage struts, the hydraulic actuating equipment for undercarriage and flaps are made by Automotive Products Co., Ltd., of Leamington. They are also responsible for the wheels, having taken over the manufacture of the Avery aircraft wheel.